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(54) **METHOD AND APPARATUS FOR CONSTRUCTING a CARTON**

VERFAHREN UND VORRICHTUNG ZUM HERSTELLEN einer VERPACKUNG

PROCEDE ET APPAREILLAGE POUR FABRIQUER UNE BOITE EN CARTON

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Description

[0001] The invention relates to a method and apparatus for constructing a carton for containing multiple articles and more particularly when the articles the carton contains are of a non-rigid structure such as pouches which may be filled with beverages or other foodstuffs and/or liquids.

[0002] Often it is desirable for a consumer to purchase a number of articles such as pouches filled with a beverage. Cartons containing a group of pouches are therefore required. Such pouches are flexible any may be delicate and can be difficult to securely and tightly package into a carton.

[0003] In JP-A-59-1631602 an apparatus for forming a carton containing a group of products is shown, which apparatus comprises a supporting means for a carton blank with two sets of articles disposable on spaced apart loading panels thereof.

[0004] Current commercial packages for these types of article are constructed from corrugated board, which is used to provide sufficient strength for palletisation of pluralities of packages but has the disadvantage that it produces a poor quality finished product especially with regard to the printed surfaces. Another disadvantage of these packages is that they require the carton blank to be pre-glued.

[0005] It is therefore desirable to provide a carton with a high aesthetic quality which has sufficient strength for palletisation. It is also desirable to reduce the handling of the pouches to minimize the possibility of damage to them.

[0006] The present invention seeks to overcome the limitations of the prior art, and offer improved print quality and allows the process of carton construction and loading to be carried out in one manufacturing machine.

Summary of the Invention

[0007] One aspect of the present invention provides a method of forming a carton containing a group of articles, as defined in appended claim 1.

[0008] Preferably the supporting means comprises a forming jig and the carton blank in substantially flat form is transferred from a supply to the forming jig so that spaced apart loading panels of the carton blank are placed on spaced outer sections of the forming jig with the unloaded further panel of the carton blank disposed therebetween on an inner section of the forming jig and so that opposed end closure panels of the carton blank automatically are folded out of the plane of respective loading panels.

[0009] Additionally, wherein reinforcing panels, hinged to the end closure panels are folded relative to the end closure panels so that reinforcing panel is caused to overlie the endmost articles in each set such that each endmost article is substantially surrounded by a loading panel, an end closure panel and a reinforcing panel.

[0010] Optionally, a separator device is positioned between each article set substantially to maintain the formation of the article sets, on their respective loading panels as the spaced loading panels are moved towards one another.

[0011] Preferably the spaced outer sections of the forming jig are raised so that the loading panels with their respective article sets are raised, and retracting the separator device as the article sets are brought together and the loading panels are brought into an upright attitude whereby the article sets are brought together with the ends of the articles in each set brought to rest on said further panel of the carton blank, destined to become a base panel of the carton, with the loading panels providing opposed side panels of the carton.

[0012] Optionally, juxtaposed reinforcing panels are brought into face to face relationship to provide a multiply partition between the endmost articles of each article set.

[0013] Preferably, the carton panels are secured to complete the formation of the carton around the consolidated article sets and the spaced outer sections of the forming jig are returned to their original positions to receive respective loading panels of a succeeding carton blank.

[0014] Preferably, successive article sets are formed on article conveying means which is synchronised with said conveyor means for inclusive carton blank and forming jig units and requisite article sets and drop-loaded onto pre-determined ones of the loading panels of each carton blank.

[0015] Another aspect of the present invention provides an apparatus for forming a carton for containing a group of articles which apparatus comprises a supporting means on which a carton blank, together with first and second sets of articles are receivable, the articles being disposed on spaced apart areas of a loading panel of a carton blank with an unloaded portion of said loading panel disposed between the article sets, wherein, conveyor means for conveying the supporting means along a path and means for manipulating the support means for raising the spaced apart areas of the loading panel together with the respective sets of articles whilst being conveyed by the conveyor means are provided for transferring the sets of articles to the unloaded portion of the loading panel so that both sets of articles are receivable thereon and said unloaded portion of the loading panel is adaptable to become a loaded base of the carton and spaced apart areas of the loading panel are adaptable to become opposed side panels of the carton.

[0016] According to an optional feature of this aspect of the invention, the supporting means comprises a forming jig and carton blank transfer means is provided for transferring successive carton blanks from a supply and for placing each blank on said forming jig and means for grouping and depositing discrete groups of articles onto said carton blank while it is disposed on said forming jig.

[0017] Preferably the means for raising the spaced

apart areas of the loading panel comprises hinged sections of said forming jig.

[0018] Preferably the forming jig comprises a follower device for following a predetermined path in a track or runner for facilitating operation of said hinged sections for raising spaced apart areas of the loading panel and thereafter lowering of the hinged sections for reloading of the forming jig.

[0019] According to another optional feature of this aspect of the invention, means is provided for limiting movement of the article sets towards one another relative to the loading panel during carton assembly.

[0020] According to yet another optional feature of this aspect, the means for limiting movement of the articles relative to the loading panel comprises a device placeable into an unfolded carton between the two sets or articles and which further maintains alignment of reinforcing panel members of the carton blank while the carton blank is being manipulated to form the carton.

Brief Description of the Drawings

[0021] An exemplary embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which;

Figure 1 is a plan view of a blank for forming a carton which is constructed by a packaging machine of the present invention;

Figure 2 is a perspective view of an empty carton formed from the blank of Figure 1;

Figure 3 is a flow chart outlining the preferred method employed by the packaging machine to construct the carton of Figure 2;

Figure 4 is a schematic view showing a preferred sequence of folding, loading, forming and gluing operations for constructing the carton of Figure 2;

Figure 5 is a schematic perspective view of apparatus used in the preferred embodiment of the packaging machine to construct the carton of Figure 2;

Figure 6 is a schematic perspective view showing the overall arrangement of the packaging machine in which the apparatus of Figure 5 assembles the carton of Figure 2; and

Figure 7 is a schematic perspective view showing the operation of a jig mechanism which forms successive loaded blanks into complete cartons.

Detailed Description of the Preferred Embodiments

[0022] A preferred embodiment of the present invention provides a packaging machine which can construct

and fill a carton with pouches or similar such articles. Figure 1 shows a blank 10 for forming a carton 30, which is shown in Figure 2, which may be constructed by the packaging machine. It is envisaged that the packaging machine may be suitable for filling and constructing other types of carton and is not limited to the carton herein described.

[0023] The blank 10 is a unitary blank formed from paperboard but may be formed from other such suitable foldable sheet material. The blank 10 comprises a series of main panels including a top panel 12, first side wall 14, bottom panel 16, second side wall 18 and securing panel 20, hinged one to the next in series along fold lines 32, 34, 36 and 38 respectively. Collectively the first and second side walls 14, 18 and bottom panel 16, form a loading panel. Spaced apart loading panels, the first and second side walls 14, 18, are separated by a further panel, the bottom panel 16.

[0024] When the package is constructed, these spaced apart loading panels are loaded with pouches, or other similar articles. The pouches are grouped into two sets of five pouches each in the preferred embodiment. These loading panels are provided by the first and second side walls 14 and 18, respectively.

[0025] The blank 10 further comprises a series of end closure panels 24a, 24b, 24c, 24d, each hinged to an opposed end of each of the first and second side walls 14, 18, along fold lines 62, 66, 46 and 42 respectively. Additionally reinforcing members 26a, 26b, 26c and 26d are provided and are hinged to each of the end closure panels 24a, 24b, 24c and 24d along fold lines 68, 70, 50 and 48 respectively. Bottom end closure flaps 22b, 22c and top end closure flaps 22a, 22d are also provided and are hinged to the opposed ends of the bottom panel 16 and first top panel 12 along fold lines 64, 44, 60 and 40 respectively.

[0026] Turning to the construction of the carton 30, shown in Figure 2, from the blank 10, the fold lines 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 60, 62, 64, 66, 68, 70 may be pre-folded or pre-broken to assist the formation of the blank 10 into the carton 30 by the packaging machine. The end closure panels 24a, 24b, 24c, 24d are folded outward of the plane of the blank 10 along with reinforcing members 26a, 26b, 26c, 26d, so that the end closure panels 24a, 24b, 24c, 24d are positioned substantially at a 90° angle to the first and second side walls 14, 18. The reinforcing members 26a, 26b, 26c, 26d are further folded about fold lines 68, 70, 50, 48 such that the pouches at each end of the group are substantially surrounded on three sides by either the first or second side walls 14, 18 and the respective end closure panel 24a, 24b, 24c, 24d and reinforcing member 26a, 26b, 26c, 26d.

[0027] Each of the side wall panels 14, 18 are folded out of the plane of the bottom panel 16 toward each other such that they are substantially parallel to each other and at approximately 90° to the bottom panel 16. In this way, the reinforcing members of each pair 26a/26b and 26c/

26c are brought into flat face contacting relation with each other.

[0028] To complete the construction of the carton; the securing panel 20 is folded inward of the carton 30, the first top panel 12 is folded to overlie the securing panel 20 and secured to it. The bottom and top end closure flaps 22b, 22c, 22a, 22d are folded towards the end closure panels 24a, 24b, 24c, 24d and secured, to lower and upper portions of the end closure panels 24a/24b, 24c/24d respectively. In this way a completely enclosed carton is formed.

[0029] It will be seen (Figure 2) that the completed carton comprises two similar compartmental portions since it is symmetrical about the vertical plane "x-x" and in effect, therefore, is the combination of two tray-like elements which are hinged together about fold line 34 and 36.

[0030] One tray-like element comprises side wall panel 14 together with reinforcing members provided by panels 24a, 26a and 24d, 26d and the other tray-like member comprises side wall panel 18 together with 24b, 26b and 24c, 26c.

[0031] When these tray-like portions are put into an upright disposition, from their initial loading position, so that the two sets of pouches are brought into juxtaposition, panels 26a and 26b and panels 26c and 26d respectively, are in face to face relationship thereby providing multiply partitions 26a/26b and 26c/26d internally of the carton intermediate the two sets of pouches.

[0032] Referring now to Figure 3 of the drawings, there is shown a flow chart of a method employed by the packaging machine for processing blanks 10 of the type outlined above. An upstream end of the machine includes a first hopper 11 (see Figure 6), or other suitable storage means in which a multiplicity of blanks 10, in flat condition, are held ready for processing. The blanks 10 are sequentially removed from the first hopper 11 by suitable feeder means, for example, a rotary vacuum feeder 13. As is known in the art, the rotary vacuum feeder comprises at least one suction cup 13a connected to a drive shaft 13b by a drive rod 13c. Drive means, for example a servo motor (not shown), rotates the drive shaft, and a cam track and cam rod (not shown) internally of the rotary vacuum feeder may be provided to define a uniform path for the suction cups as the drive shaft is rotated.

[0033] The first hopper 11 may be a 'gravity feed' type, whereby the blanks 10 are held on the first hopper at an incline to provide a positive feed. Thus, a blank 10 in flat condition is removed from the first hopper and is rotated by the vacuum feeder 13 to an in-feed conveyor 15 at the in-feed end of the machine. Thus, the blank 10 is placed onto suitable conveying means, step A1.

[0034] The blank 10 may then undergo a series of pre-folding stages, step A2, to pre-break the fold lines of the blank 10. The pre-breaking procedure may be achieved by passing the blank 10 past a series of wheels or guide tracks as is known in the art. When the articles, in this case pouches, to be packaged do not have a rigid struc-

ture they provide little or no reaction to forces applied to them. It is therefore advantageous to pre-fold or pre-break the fold lines of the blank 10. This stage may be unnecessary if an alternative material were to be used to construct the blank 10 or if the carton 30 were to be loaded with a more rigid type of article. The pre-breaking stage is illustrated by stage B1 of Figure 4. The pre-breaking is achieved in the preferred embodiment with the blank 10 moving, in the forward direction indicated by an arrow, through the packaging machine in the orientation shown in Stage B1.

[0035] The blank 10 is then rotated, step A3, about a vertical axis through approximately 90°. This stage may be unnecessary in an alternative embodiment if the pre-breaking sequence does not require the blank 10 to be in a different orientation to that required for the construction procedure. The rotation is achieved by picking up the blank using a rotatable suction device 17 (Figure 6) known per se in the art, and rotating the blank through the desired angle. Referring to stage B1 of Figure 4 it can be seen that the blank is rotated in a clockwise direction as shown by the arrow A, but it should be obvious the present invention is not limited to such.

[0036] The blank 10 is then placed by vertical movement of the rotatable suction device 17, step A4, into a forming jig 110 to be herein described with reference to Figures 5 and 6. This step may be carried out prior to the rotation stage of step A3 in which case the blank 10 and the jig 110 may be rotated together. The blank 10 is placed such that the panels 14, 16, 18 are placed in registry with sections 132a, 140 and 132b respectively. Spaced apart loading panels 14, 18 of the blank 10 are placed on spaced outer sections 132a and 132b and the bottom panel 16 is placed on inner section 140. The bottom end closure flaps 22b, 22c protrude through the respective gaps between the end walls 124a/124b and 124c/124d. The end closure panels 24a, 24b, 24c, 24d are folded upward out of the plane of the panels 14, 16, 18 when the blank 10 is placed in the jig 110 since the end walls 124a, 124b, 124c, 124d engage the end closure panels and facilitate folding about fold lines 42, 46, 62, 66 as shown in stage B2 of Figure 4. In alternative embodiments it may be necessary to first fold end closure panels 24a, 24b, 24c, 24d upwardly out of the plane of the loading panel of the blank, about fold lines 42, 46, 62, 66. However in the preferred embodiment folding of the end closure panels 24a, 24b, 24c, 24d is achieved automatically when the blank 10 engages the end walls 124a, 124b, 124c, 124d upon placement into the forming jig 110.

[0037] The pouches are conveyed, step A5, to the packaging machine, whilst, before or after, the steps A1-A4 relating to the blank's 10 preparation; in this case comprising; loading A1, pre-folding A2, rotating A3 and placement A4 of the blank 10 in the forming jig 110. In the preferred embodiment the pouches are conveyed to the packaging machine and grouped, step A6, into sets of articles whilst the blank 10 is partially folded, as de-

scribed. The pouches require careful handling to minimize the risk of damage.

[0038] The pouches are fed from outfeed conveyors 19, 21 of a pouch filing device (not shown) into individual caddies 23, 25 where they are grouped together on the out-feed conveyor. The contents of the caddies are then emptied into trays 27, 29 respectively capable of accommodating multiple pouches, as disclosed in PATENT NUMBER US 5,046,598. Each tray conveys a group of pouches to the blank 10 disposed on a jig- 110 as further described below.

[0039] The pouches are loaded, step A7, onto the blank 10 in sets or groups of pouches. This is achieved by positioning each tray above the blank and opening trap doors 31, 33 in respective ones of the trays 27, 29 the trays allowing the pouches to fall onto the blank. In the preferred embodiment the articles are loaded in two sets of five each, a tray being used to convey each set. However, it is envisaged that a different grouping could be used. The sets of pouches are loaded onto the loading panels 14, 18 of the blank, one set being placed upon panel 14 and the other set upon panel 18 and are spaced apart by a further panel 16 of the blank 10. In the preferred embodiment, the pouches are oriented such that the bottoms of the pouches all face the same direction when loaded on the blank 10, as shown in stage B3 of Figure 4. The pouches are loaded in this way because they are tapered; this orientation of the pouches allows the narrow end of one set of pouches to be juxtaposed with the wide end of the other set of pouches. The pouches in each of the sets are also placed in a side by side overlapping relationship again to minimize the unused space in the assembled package. Thus, the volume occupied by the pouches is minimized and allows the package size to be reduced. Alternative embodiments may utilize alternative orientations and configurations of the pouches within the carton 30 without departing from the scope of the invention.

[0040] The next stage in the package assembly is folding, step A8, of the reinforcing members 26a, 26b, 26c, 26d. The reinforcing members 26a, 26b, 26c, 26d are folded inwardly about fold lines 48, 50, 68, 70 of the carton 30 around at least a portion of the sets of pouches such that the pouches at each end of the group are substantially surrounded on three sides by either the first or second side walls 14, 18 and the respective end closure panel 24a, 24b, 24c, 24d and reinforcing member 26a, 26b, 26c, 26d. This is best shown in stage B4 of Figure 4.

[0041] The folding of these reinforcing members may be achieved by use of wheels or fixed guides as known in the art. However, it is envisaged that other means could be used without departing from the scope of the present invention. The reinforcing members 26a, 26b, 26c, 26d enhance the strength of the constructed package to allow palletisation or otherwise stacking of a plurality of assembled packages. In alternative embodiments where rigid articles may be used in the package these reinforcing members 26a, 26b, 26c, 26d may not be required as the arti-

cles themselves may contribute sufficient strength to the package to allow palletisation of the packages.

[0042] In the preferred embodiment, a separator or divider 210, to be herein described with reference to Figures 5 and 6, is placed at step A9 between the two sets of pouches. This separator 210 substantially prevents movement of the pouch sets towards one another and/or maintains them in a suitable configuration for the folding stage of the package's construction.

[0043] The outer sections 132a, 132b of the forming jig 110, supporting spaced apart loading panels 14 and 18 are then simultaneously raised, step A10 of Figure 3 and stage B5 and B6 of Figure 4, rotationally, about hinged connections 130a, 130b to the centre portion 140, as indicated by arrows in stage B5 and B6 of Figure 4. This has the effect of bringing together the two sets of pouches in juxtaposed relationship. Each of the spaced apart loading panels 14, 18 of the blank 10 are thereby simultaneously folded, step A10, out of the plane of the bottom panel 16 toward each other by the raising of the outer sections 132a, 132b of the jig. In this way pairs of reinforcing members, 26a/26b and 26d/26c are brought into flat face contacting relation with each other and the sets of pouches are brought from a position in which they rest on the spaced apart loading panels of the load panel 14, 18, to a position in which an end of each of the pouches rests upon the bottom panel 16.

[0044] The load exerted on the carton 30 from the sets of pouches is thus transferred from the spaced apart loading panels 14, 18 of the blank 10, when in the loading stage, step A7 of Figure 3 and stage B3 of Figure 4, to the previously unloaded bottom panel 16, during the folding stage. Bottom panel 16 of the blank 10 thereby becomes the bottom 16 of the package and the previously loaded loading panels 14, 18 become the side panels 14, 18.

[0045] The securing panel 20 is then folded inward of the carton and the top panel 12 is then folded to overlie the securing panel 20 and secured to it, step A11, using adhesive means to maintain assembly of the package, as shown in stage B7 of Figure 4.

[0046] The previously raised outer sections 132a, 132b of the forming jig 110 are lowered, step A12, by rotationally moving them away from the side panels 14, 18 as shown by the arrow in stage B7 of Figure 4 so that the carton then at stage B8 is ready for further processing.

[0047] The package is then rotated, step A13, about a vertical axis through approximately 90° as shown in stage B9 of Figure 4 such that the end closure flaps 22a, 22b, 22c, 22d can be secured, step A14, in a further gluing stage. Referring to stage B9 of Figure 4, it can be seen that the blank is rotated in a clockwise direction as shown by the arrow, but the rotation may be additionally combined with removal of the package from the forming jig 110. The skilled reader will appreciate that in alternative machine/carton configurations this rotation stage may not be required. The bottom and top end closure flaps 22b, 22c, 22a, 22d are folded and secured, step A 14, to

lower and upper portions of the end closure panels 24a/24b, 24c/24d respectively as shown in stages B10 and B11 of Figure 4. In this way a completely enclosed carton is formed, which contains two sets of five pouches, the sets being partially separated by the reinforcing members 26a, 26b, 26c, 26d. Figure 2 shows a schematic diagram of a carton 30 constructed from the blank 10, in an assembled package according to the present embodiment the carton 30 would contain ten pouches in two rows of five each with the reinforcing members between them.

[0048] Referring now to Figures 5 and 6 there is shown a forming jig 110 for controlling the formation of a package according to the present embodiment. The divider or separator 210 is also shown in Figures 5 and 6. The separator 210 provides a rigid temporary wall against which the sets of pouches can be brought into an upright attitude.

[0049] Figure 5 shows the forming jig 110 onto which the blank 10 is placed and the separator 210. As indicated earlier, the blank 10 is placed such that spaced apart loading panels 14, 18 of the blank 10 lie on outer sections 132a, 132b of the forming jig 110 respectively and panel 16 is placed on section 140 of the forming jig 110. End walls 124a, 124b, 124c, 124d of the forming jig 110 are positioned such that they facilitate folding of end panels 24a, 24b, 24c, 24d out of the plane of the panels 14, 16, 18. The height of the walls 124a, 124b, 124c, 124d should not prevent the panels 14 and 18 being raised to be substantially 90° to the panel 16; or in alternative embodiments, otherwise prevent construction of the package. End flaps 22b and 22c protrude through the space between walls 124a, 124b and 124c, 124d, respectively.

[0050] Sections 132a and 132b are coupled together by section 140 of the forming jig 110 by hinged connections 130a and 130b. Section 140 follows a guide track 112. The guide track substantially prevents section 140 and hence the hinged connections 130a 130b from moving in a direction perpendicular to the direction of travel the forming jig 110. A conveyor means, not shown, propels the forming jig 110 along the guide track in the desired direction of travel as indicated by the arrow "V" in Figure 5.

[0051] Wheels 142a, 142b which are shown at the forward end of jig 110 in Figures 5, 6 and 7 facilitate the rotation of sections 132a, 132b about hinged connections 130a, 130b in any upward direction thereby achieving the folding of panels 14, 18 about fold lines 34, 36. The rotation as indicated by arrows "W" in Figure 5 is achieved by causing each wheel 142a, 142b to engage a rail or runner, 150a and 150b, best shown in Figure 7, which, by virtue of its overall shape, causes the wheels 142a 142b to be raised upwardly out of the horizontal plane of the guide track 112 and simultaneously inwardly towards the guide track 112. It will be appreciated by those skilled in the art that this process could be achieved by alternative means.

[0052] The separator 210 of Figure 5 comprises a main frame 212 a portion 214 of which is coupled to an overhead conveyor means (not shown). A dividing plate 216

which restricts movement of the sets of pouches during the package's assembly is resiliently mounted in the frame 212 by resilient means, for example, spring assembly 215. The separator 210 of Figure 5 runs above the forming jig 110, on the overhead conveyor means, as the forming jig 110 passes through the section of the packaging machine where the folding of the blank 10 occurs. This is best illustrated in Figure 7.

[0053] Two rollers 218a, 218b one on each of the opposed sides of the main body 212 are positioned such that they maintain correct alignment of the reinforcing panels 26a, 26b, 26c, 26d during the package's construction. In alternative embodiments, these rollers could have an additional function such as the application of an adhesive to the reinforcing members 26a, 26b, 26c, 26d.

[0054] Referring again to Figure 7, sections 132a and 132b of the forming jig 110 are rotated towards each other, by following the track 150a, 150b. The separator 210 is raised upwardly out of the package, maintaining correct alignment of the reinforcing members 26a, 26b, 26c, 26d as it rises (stage C3 of Figure 6). Referring, in particular, to Figure 6, the jig 110 enters the carton assembly stage of the packaging machine as indicated by stage C2, in which the pouches are loaded onto loading panels 14 and 18 of the blank 10 and the reinforcing members 26a, 26b, 26c, 26d have been folded inward of the blank 10. The separator 210 is brought into alignment above the jig 110. By stage C2 of this section of the packaging machine, the separator 210 has been placed between the two groups of pouches. The wheels 142a, 142b are engaged with the beginning of the track 150a, 150b. The entry end of the track 150a, 150b is positioned to capture the wheels 142a, 142b within the tracks 150a, 150b as it approaches. This minimizes the risk of the wheel missing the track 150a, 150b and/or becoming jammed against the track 150a, 150b. As the jig 110 moves along the guide track 112 the wheels 142a, 142b follow the track 150a, 150b thus moving the outer sections 132a, 132b of the jig 110, and hence the spaced apart loading panels 14, 18 toward each other. The wheels follow the track 150a, 150b until at their highest elevation (stage C4 of Figure 7) from the horizontal of the tracks, upwardly and inwardly deviate from the start position. In stage C4 of Figure 7, the carton 30 is in a substantially assembled state. Whilst the jig 110 is moving forward along the guide track 112 and the wheels 142a, 142b are following the track 150a 150b to raise the outer sections 132a, 132b of the jig 110, the separator 210 is moved upward, away from the bottom panel 16 of the blank 10. As the separator 210 moves upwardly the rollers 218a, 218b on either side of dividing section 216 maintain the correct alignment of the reinforcing members 26a, 26b, 26c, 26d relative to the pouches. However, by virtue of its resilient mounting, upward movement of the dividing plate 216 lags behind that of the main frame 212 and this lost motion allows a dwell time of the plate 216 between the pouch sets until they will inevitably be brought into juxtaposition as sections 132a and 132b approach one another.

[0055] The top panel 12 is then adhered to the securing panel 20 to maintain the carton in an assembled state and then the wheels 142a, 142b follow the track 150a, 150b downwardly and outwardly in a mirror image of the section of track 150a, 150b shown. Thus the outer sections 132a, 132b of the jig 110 are disengaged from the side panel 14, 18 of the carton 30.

[0056] However, at position C4 rear wheels 143a, 143b of the forming jig, carried by sections 132a, 132b, respectively engage double rail sets 153a, 153b respectively which are shaped to draw down the sections 132a, 132b into their horizontal loading positions as the forming jig 110 continues its forward motion.

[0057] It is envisaged that the blank 10 can vary depending upon the shape and/or quantity of articles to be packaged and accordingly, a machine in accordance with one or more aspects of the present invention is adjustable in numerous respects so that it can process a wide variety of such blanks and is not limited to the specific example outlined above. Indeed a machine of the present invention may be used to package items other than beverage pouches within a paperboard carton. For example, it is envisaged that any other similar article could be processed using a machine of the present invention.

[0058] It will be recognized that as used herein, directional references such as "top", "bottom", "end" and "side" do not limit the respective panels to such orientation, but merely serve to distinguish these panels from one another. Any reference to hinged connection should not be construed as necessarily referring to a single fold line only: indeed it is envisaged that hinged connection can be formed from one or more of the following: a score line, a frangible line or a fold line, without departing from the scope of the present invention.

[0059] It is envisaged that one skilled in the art could make minor changes to the present invention without departing from the scope of the invention, for example alternative configurations of the group of articles could be used, alternative means to facilitate the folding of the blank around the pouches could be used which would fulfil the alignment and construction properties of the preferred embodiment herein described. It will be appreciated by those skilled in the art that the present invention is not limited to cartons of the type described but could be applied to other carton types. It is therefore envisaged that the method employed by the present invention may also be adjustable in order to accommodate a variety of carton arrangements.

Claims

1. A method of forming a carton (30) containing a group of articles (A), which method comprises placing a carton blank (10) on a supporting means (110), placing first and second sets of articles (A) onto spaced apart loading panels (14, 18) of the carton blank (10) so that the article sets are spaced apart with an un-

loaded further panel (16) of the carton blank (10) disposed between the article sets, conveying the supporting means (110) along a conveyor means and causing outer sections of the supporting means (110) to be brought together thereby raising the spaced loading panels (14, 18) together with the respective sets of articles whilst being conveyed by the conveyor means to transfer the sets of articles to the unloaded further panel (16) so that said unloaded further panel (16) becomes a loaded base (16) of the carton (30) and those spaced apart areas of the loading panel (14, 18) become opposed side panels (14, 18) of the carton (30).

2. A method according to claim 1 wherein the supporting means (110) comprises a forming jig, and wherein the carton blank (10) in substantially flat form is transferred from a supply to the forming jig (110) so that spaced apart loading panels (14, 18) of the carton blank (10) are placed on spaced outer sections (132a, 132b) of the forming jig with the unloaded further panel (16) of the carton blank (10) disposed therebetween on an inner section (140) of the forming jig (110) and so that opposed end closure panels (24a, 24b, 24c, 24d) of the carton blank (10) automatically are folded out of the plane of respective loading panels (14, 18).

3. A method according to claim 2 wherein reinforcing panels (26a, 26b, 26c, 26d), hinged to the end closure panels (24a, 24b, 24c, 24d) are folded relative to the end closure panels (24a, 24b, 24c, 24d) so that a reinforcing panel (26a, 26b, 26c, 26d) is caused to overlie the endmost articles in each set such that each endmost article is substantially surrounded by a loading panel (14, 18), an end closure panel (24a, 24b, 24c, 24d) and a reinforcing panel (26a, 26b, 26c, 26d)..

4. A method according to claim 3 wherein a separator device (210) is positioned between each article set substantially to maintain the formation of the article sets, on their respective loading panels (14, 18) as the spaced loading panels (14, 18) are moved towards one another.

5. A method according to claim 4 wherein the spaced outer sections (132a, 132b) of the forming jig (110) are raised so that the loading panels (14, 18) with their respective articles sets are raised, and retracting the separator device (210) as the article sets are brought together and the loading panels are brought into an upright attitude whereby the article sets are brought together with the ends of the articles in each set brought to rest on said further panel (16) of the carton blank (10), destined to become a base panel of the carton (30), with the loading panels (14, 18) providing opposed side panels of the carton (30).

6. A method according to any of claims 3 to 5 wherein juxtaposed reinforcing panels (26a/26b, 26c/26d) are brought into face-to-face relationship to provide a multi-ply partition between the endmost articles of each article set.
7. A method according to claim 5 wherein carton panels are secured to complete the formation of the carton (30) around the consolidated article sets and the spaced outer sections (132a, 132b) of the forming jig (110) are returned to their original positions to receive respective loading panels of a succeeding carton blank (10).
8. A method according to claim 2 wherein successive article sets are formed on article conveying means which is synchronised with said conveyor means for inclusive carton blank (10) and forming jig (110) units and requisite article sets are drop-loaded onto predetermined ones of the loading panels (14, 18) of each carton blank (10).
9. An apparatus for forming a carton (30) for containing a group of articles (A) which apparatus comprises a supporting means (110) on which a carton blank (10), together with first and second sets of articles (A) are receivable, the articles (A) being disposable on spaced apart areas of a loading panel (14, 18) of a carton blank (10) with an unloaded portion (16) of said loading panel (14, 18) disposable between the article sets and **characterised by** conveyor means for conveying the supporting means (110) along a path and means for manipulating the support means (110) for raising the spaced apart areas of the loading panel (14, 18) together with the respective sets of articles whilst being conveyed by the conveyor means for transferring the sets of articles to the unloaded portion (16) of the loading panel (14, 18) so that both sets of articles are receivable thereon and said unloaded portion (16) of the loading panel is adaptable to become a loaded base (16) of the carton (30) and spaced apart areas of the loading panel are adaptable to become opposed side panels of the carton (30).
10. Apparatus according to claim 9 wherein the supporting means (110) comprises a forming jig and wherein carton blank transfer means is provided for transferring successive carton blanks from a supply and for placing each carton blank (10) on said forming jig and means for grouping and depositing discrete groups of articles onto said carton blank (10) while it is disposed on said forming jig (110).
11. An apparatus according to claim 10 wherein the means for raising the spaced apart areas of the loading panel comprises hinged sections (132a, 132b) of said forming jig (110).

12. An apparatus according to claim 11 wherein the forming jig (110) comprises a follower device for following a predetermined path in a track or runner for facilitating operation of said hinged sections for raising spaced apart areas of the loading panel and thereafter lowering of the hinged sections for reloading of the forming jig (110).
13. An apparatus according to any of claims 9 to 12, further comprising means (210) for limiting movement of the article sets towards one another relative to the loading panel (16) during carton (30) assembly.
14. An apparatus according to claim 13 wherein the means (210) for limiting movement of the articles (A) relative to the loading panel (16) comprises a device placeable into an unfolded carton between the two sets of articles and which further maintains alignment of reinforcing panel members (26a, 26b, 26c, 26d) of the carton blank (10) while the carton blank (10) is being manipulated to form the carton (30).

25 Patentansprüche

1. Verfahren zum Ausbilden einer Schachtel (30), die eine Gruppe von Gegenständen (A) enthält, wobei das Verfahren das Anordnen eines Schachtelzuschnitts (10) auf Trägermitteln (110) umfasst, das Anordnen eines ersten und eines zweiten Satzes von Gegenständen (A) auf beabstandeten Ladewandflächen (14, 18) des Schachtelzuschnitts (10), so dass die Gegenstandssätze voneinander beabstandet sind, wobei eine nicht beladene weitere Wandfläche (16) des Schachtelzuschnitts (10) zwischen den Gegenstandssätzen angeordnet ist, das Befördern der Trägermittel (110) entlang von Beförderungsmitteln und das Bewirken, dass äußere Abschnitte der Trägermittel (110) zusammengebracht werden, um somit die beabstandeten Ladewandflächen (14, 18) zusammen mit den jeweiligen Sätzen von Gegenständen anzuheben, während diese durch die Beförderungsmittel befördert werden, um die Sätze von Gegenständen zu der nicht beladenen weiteren Wandfläche (16) zu transferieren, so dass die nicht beladene weitere Wandfläche (16) zu einer beladenen Bodenwandfläche (16) der Schachtel (30) wird und die beabstandeten Bereiche der Ladewandflächen (14, 18) zu gegenüberliegenden Seitenwandflächen (14, 18) der Schachtel (30) werden.
2. Verfahren nach Anspruch 1, wobei die Trägermittel (110) eine Ausbildungsspannvorrichtung umfassen und wobei der Schachtelzuschnitt (10) in einer im Wesentlichen flachen Form von einem Magazin zu der Ausbildungsspannvorrichtung (110) transferiert wird, so dass die beabstandeten Ladewandflächen

- (14, 18) des Schachtelzuschnitts (10) auf beabstandeten äußeren Abschnitten (132a, 132b) der Ausbildungsspannvorrichtung angeordnet werden, wobei die nicht beladene weitere Wandfläche (16) des Schachtelzuschnitts (10) auf einem inneren Abschnitt (140) der Ausbildungsspannvorrichtung (110) dazwischen angeordnet ist, und so dass gegenüberliegende Endverschlusswandflächen (24a, 24b, 24c, 24d) des Schachtelzuschnitts (10) automatisch aus der Ebene von jeweiligen Ladewandflächen (14, 18) heraus gefaltet werden.
3. Verfahren nach Anspruch 2, wobei Verstärkungswandflächen (26a, 26b, 26c, 26d), die gelenkig an die Endverschlusswandflächen (24a, 24b, 24c, 24d) angebracht sind, relativ zu den Endverschlusswandflächen (24a, 24b, 24c, 24d) gefaltet werden, so dass bewirkt wird, dass eine Verstärkungswandfläche (26a, 26b, 26c, 26d) über den endseitigen Gegenständen in jedem Satz liegt, so dass jeder endseitige Gegenstand im Wesentlichen von einer Ladewandfläche (14, 18), einer Endverschlusswandfläche (24a, 24b, 24c, 24d) und einer Verstärkungswandfläche (26a, 26b, 26c, 26d) umgeben ist.
 4. Verfahren nach Anspruch 3, wobei eine Separatorvorrichtung (210) zwischen jedem Gegenstandssatz positioniert ist, um im Wesentlichen die Formation der Gegenstandssätze beizubehalten, und zwar auf deren jeweiligen Ladewandflächen (14, 18), wenn die beabstandeten Ladewandflächen (14, 18) aufeinander zu bewegt werden.
 5. Verfahren nach Anspruch 4, wobei die beabstandeten äußeren Abschnitte (132a, 132b) der Ausbildungsspannvorrichtung (110) angehoben werden, so dass die Ladewandflächen (14, 18) mit deren jeweiligen Gegenstandssätzen angehoben werden, und die Separatorvorrichtung (210) zurückgezogen wird, wenn die Gegenstandssätze zusammengebracht werden und die Ladewandflächen in einen aufrecht stehenden Zustand gebracht werden, wodurch die Gegenstandssätze zusammengebracht werden, wobei die Enden der Gegenstände in jedem Satz derart verbracht werden, um auf der weiteren Wandfläche (16) des Schachtelzuschnitts (10) zu ruhen, die dazu bestimmt ist, zu einer Bodenwandfläche der Schachtel (30) zu werden, wobei die Ladewandflächen (14, 18) gegenüberliegende Seitenwandflächen der Schachtel (30) bereitstellen.
 6. Verfahren nach einem der Ansprüche 3 bis 5, wobei nebeneinander angeordnete Verstärkungswandflächen (26a/26b, 26c/26d) in eine flächenzugewandte Beziehung gebracht werden, um eine mehrlagige Unterteilung zwischen den endseitigen Gegenständen von jedem Gegenstandssatz bereitzustellen.
 7. Verfahren nach Anspruch 5, wobei Schachtelwandflächen befestigt werden, um die Ausbildung der Schachtel (30) um die konsolidierten Gegenstandssätze zu vervollständigen, und die beabstandeten äußeren Abschnitte (132a, 132b) der Ausbildungsspannvorrichtung (110) werden in deren Ursprungspositionen zurückgeführt, um jeweilige Ladewandflächen eines nachfolgenden Schachtelzuschnitts (10) aufzunehmen.
 8. Verfahren nach Anspruch 2, wobei aufeinanderfolgende Gegenstandssätze auf Gegenstandsbeförderungsmitteln ausgebildet werden, die mit den Beförderungsmitteln synchronisiert sind, so dass ein Schachtelzuschnitt (10) und eine Ausbildungsspannvorrichtung (110) und erforderliche Gegenstandssätze auf vorbestimmte Ladewandflächen (14, 18) von jedem Schachtelzuschnitt (10) fallen gelassen werden.
 9. Vorrichtung zum Ausbilden einer Schachtel (30), um eine Gruppe von Gegenständen (A) aufzubewahren, wobei die Vorrichtung Trägermittel (110) umfasst, auf denen ein Schachtelzuschnitt (10) zusammen mit einem ersten und einem zweiten Satz von Gegenständen (A) aufgenommen werden kann, wobei die Gegenstände (A) auf beabstandeten Bereichen einer Ladewandfläche (14, 18) eines Schachtelzuschnitts (10) angeordnet werden können, wobei ein nicht beladener Abschnitt (16) der Ladewandflächen (14, 18) zwischen den Gegenstandssätzen angeordnet werden kann, **gekennzeichnet durch** Beförderungsmittel zum Befördern der Trägermittel (110) entlang eines Weges sowie Mittel zum Manipulieren der Trägermittel (110), um die beabstandeten Bereiche der Ladewandfläche (14, 18) zusammen mit den jeweiligen Sätzen von Gegenständen anzuheben, während diese von den Beförderungsmitteln befördert werden, um die Sätze von Gegenständen zu dem nicht beladenen Abschnitt (16) der Ladewandfläche (14, 18) zu transferieren, so dass beide Sätze von Gegenständen darauf aufgenommen werden können, und wobei der nicht beladene Abschnitt (16) der Ladewandfläche ausgestaltet ist, zu einer beladenen Bodenwandfläche (16) der Schachtel (30) zu werden, und wobei beabstandete Bereiche der Ladewandfläche ausgestaltet sind, zu gegenüberliegenden Seitenwandflächen der Schachtel (30) zu werden.
 10. Vorrichtung nach Anspruch 9, wobei die Trägermittel (110) eine Ausbildungsspannvorrichtung umfassen, und wobei Schachtelzuschnittstransfermittel bereitgestellt sind, um sukzessive Schachtelzuschnitte von einem Magazin zu transferieren und um jeden Schachtelzuschnitt (10) auf der Ausbildungsspannvorrichtung anzuordnen, sowie Mittel zum Gruppieren und Abgeben diskreter Gruppen von Gegenständen.

den auf den Schachtelzuschnitt (10), während dieser auf der Ausbildungsspannvorrichtung (110) angeordnet ist.

11. Vorrichtung nach Anspruch 10, wobei die Mittel zum Anheben der beabstandeten Bereiche der Ladewandfläche angelenkte Bereiche (132a, 132b) der Ausbildungsspannvorrichtung (110) umfassen. 5
12. Vorrichtung nach Anspruch 11, wobei die Ausbildungsspannvorrichtung (110) eine Folgevorrichtung umfasst, um einem vorbestimmten Weg in einer Spur oder einem Läufer zu folgen, um die Wirkungsweise der angelenkten Bereiche zu vereinfachen, um beabstandete Bereiche der Ladewandfläche anzuheben und anschließend die angelenkten Bereiche abzusenken, um die Ausbildungsspannvorrichtung (110) erneut zu beladen. 10 15
13. Vorrichtung nach einem der Ansprüche 9 bis 12, wobei die Vorrichtung ferner Mittel (210) zum Begrenzen der Bewegung der Gegenstandssätze aufeinander zu relativ zu der Ladewandfläche (16) während des Aufbaus der Schachtel (30) umfasst. 20 25
14. Vorrichtung nach Anspruch 13, wobei die Mittel (210) zum Begrenzen der Bewegung der Gegenstände (A) relativ zu der Ladewandfläche (16) eine Vorrichtung umfassen, die in einer nicht gefalteten Schachtel zwischen den zwei Sätzen von Gegenständen angeordnet werden kann und ferner die Ausrichtung von Verstärkungswandflächenelementen (26a, 26b, 26c, 26d) des Schachtelzuschnitts (10) beibehält, während der Schachtelzuschnitt (10) bearbeitet wird, um die Schachtel (30) auszubilden. 30 35

Revendications

1. Procédé de mise en forme d'une boîte en carton (30) comprenant un groupe d'articles (A), ce procédé inclut les étapes consistant à placer une ébauche de carton (10) sur un moyen de support (110), placer la première et la deuxième série d'articles (A) sur des panneaux de chargement espacés l'un de l'autre (14, 18) de l'ébauche de carton (10) de sorte que les séries d'articles soient espacées l'une de l'autre par un panneau supplémentaire non chargé (16) de l'ébauche de carton (10) placé entre les séries d'articles, amener le moyen de support (110) le long d'un moyen convoyeur et faire que des sections extérieures du moyen de support (110) se réunissent et ainsi relèvent les panneaux de chargement espacés (14, 18) avec les séries d'articles respectives pendant qu'ils sont amenés par le moyen convoyeur à transférer les séries d'articles au panneau supplémentaire non chargé (16), de sorte que ledit panneau supplémentaire (16) devient une base chargée (16) de 40 45 50 55

la boîte en carton (30) et ces zones espacées du panneau de chargement (14, 18) deviennent des panneaux latéraux opposés (14, 18) de la boîte en carton (30).

2. Procédé selon la revendication 1 où le moyen de support (110) comprend un dispositif de formage, et où l'ébauche de carton (10) ayant une forme substantiellement plane se déplace d'un point d'approvisionnement vers le dispositif de formage (110), de sorte que les panneaux de chargement espacés l'un de l'autre (14, 18) de l'ébauche de carton (10) sont placés sur des sections espacées extérieures (132a, 132b) du dispositif de formage avec le panneau supplémentaire non chargé (16) de l'ébauche de carton (10) placé sur une section intérieure (140) du dispositif de formage (110) de sorte que les panneaux de fermeture d'extrémité opposés (24a, 24b, 24c, 24d) de l'ébauche de carton (10) soient automatiquement pliés en dehors du plan des panneaux de chargement respectifs (14, 18). 2. 3.
3. Procédé selon la revendication 2 où les panneaux de renfort (26a, 26b, 26c, 26d), reliés de manière articulée aux panneaux de fermeture d'extrémité (24a, 24b, 24c, 24d) sont repliés par rapport aux panneaux de fermeture d'extrémité (24a, 24b, 24c, 24d), de sorte qu'un panneau de renfort (26a, 26b, 26c, 26d) recouvre les articles d'extrémité dans chaque série de telle manière que chaque article d'extrémité est sensiblement entouré par un panneau de chargement (14, 18), un panneau de fermeture d'extrémité (24a, 24b, 24c, 24d) et un panneau de renfort (26a, 26b, 26c, 26d). 3. 4.
4. Procédé selon la revendication 3 où un dispositif séparateur (210) est placé entre chaque série d'articles substantiellement pour maintenir la formation des séries d'articles, sur leurs panneaux de chargement respectifs (14, 18) quand les panneaux de chargement espacés (14, 18) se déplacent l'un vers l'autre. 4. 5.
5. Procédé selon la revendication 4 où les sections espacées extérieures (132a, 132b) du dispositif de formage (110) sont posées de telle sorte que les panneaux de chargement (14, 18) sont soulevés avec leurs séries d'articles respectives, et le dispositif de séparation se rétracte (210) quand les séries d'articles sont réunies et les panneaux de chargement sont mis en position verticale et ainsi les séries d'articles sont réunies avec les extrémités des articles de chaque série amenés à reposer sur ledit panneau supplémentaire (16) de l'ébauche de carton (10), destiné à devenir un panneau de base de la boîte en carton (30), avec les panneaux de chargement (14, 18) fournissant des panneaux latéraux opposés de la boîte en carton (30). 5. 6.

6. Procédé selon l'une quelconque des revendications 3 à 5 où les panneaux de renfort juxtaposés (26a/26b, 26c/26d) sont placés dans une relation de face-à-face pour pouvoir fournir une cloison multicouche entre les articles d'extrémité de chaque série d'articles.
7. Procédé selon la revendication 5 où les panneaux de carton sont fixés pour pouvoir compléter la mise en forme de la boîte en carton (30) autour des séries d'articles unifiées et les sections espacées extérieures (132a, 132b) du dispositif de formage (110) retournent à leurs positions initiales afin de pouvoir recevoir des panneaux de chargement respectifs d'une ébauche de carton suivante (10).
8. Procédé selon la revendication 2 où les séries d'articles successives se forment sur le moyen de transport d'articles qui est synchronisé avec ledit moyen convoyeur pour l'ébauche de carton inclusive (10) et les unités de dispositif de formage (110) et les séries d'articles prescrites sont chargées sur les panneaux de chargement prédéterminés (14, 18) de chaque ébauche de carton (10).
9. Appareil pour la mise en forme d'une boîte en carton (30) pour contenir un groupe d'articles (A), cet appareil comprend un moyen de support (110) sur lequel sont reçues une ébauche de carton (10), avec la première et la deuxième série d'articles (A), les articles (A) pouvant être disposés sur les zones espacées l'une de l'autre d'un panneau de chargement (14, 18) d'une ébauche de carton (10) avec une partie non chargée (16) dudit panneau de chargement (14, 18) pouvant être disposée entre les séries d'articles et qui se **caractérise par** un moyen convoyeur pour le transport des moyens de support (110) le long d'une trajectoire et un moyen pour la manipulation du moyen de support (110), qui permet de relever les zones espacées l'une de l'autre du panneau de chargement (14, 18) ensemble avec les séries d'articles respectives pendant son transport par le moyen convoyeur pour assurer le transfert des séries d'articles à la partie non chargée (16) du panneau de chargement (14, 18) de sorte que les deux séries d'articles peuvent y être reçues et ladite portion non chargée (16) du panneau de chargement s'adapte afin de devenir une base chargée (16) de la boîte en carton (30) et les zones espacées l'une de l'autre du panneau de chargement s'adaptent pour se transformer en panneaux latéraux opposés de la boîte (30).
10. Appareil selon la revendication 9 où le moyen de support (110) comprend un dispositif de formage et où il est prévu un moyen de transfert d'ébauche de carton qui sert à déplacer les ébauches de carton successives d'un point d'approvisionnement et pour la mise en place de chaque ébauche de carton (10) sur ledit dispositif de formage ainsi qu'un moyen qui permet de regrouper et déposer des groupes d'articles discontinus sur ladite ébauche de carton (10) au cours de sa mise en place sur ledit dispositif de formage (110).
11. Appareil selon la revendication 10 où le moyen qui sert à relever les sections espacées l'une de l'autre du panneau de chargement comprend des sections articulées (132a, 132b) dudit dispositif de formage (110).
12. Appareil selon la revendication 11 où le dispositif de formage (110) comprend un dispositif suiveur qui suit une voie prédéterminée dans une piste ou canal qui permet de faciliter le fonctionnement desdites sections articulées pour faire relever les sections espacées l'une de l'autre du panneau de chargement et par la suite pour faire abaisser les sections articulées pour le rechargement du dispositif de formage (110).
13. Appareil selon l'une quelconque des revendications 9 à 12, comprenant en outre un moyen (210) de limitation du mouvement des séries d'articles les uns envers les autres par rapport au panneau de chargement (16) au cours de la mise en forme de la boîte en carton (30).
14. Appareil selon la revendication 13 où le moyen (210) de limitation du mouvement des articles (A) par rapport au panneau de chargement (16) comprend un dispositif susceptible d'être placé dans un carton ouvert entre les deux séries d'articles et qui en outre maintient l'alignement des membres de panneau de renfort (26a, 26b, 26c, 26d) de l'ébauche de carton (10), pendant que l'ébauche de carton (10) est manipulée de manière à former la boîte en carton (30).

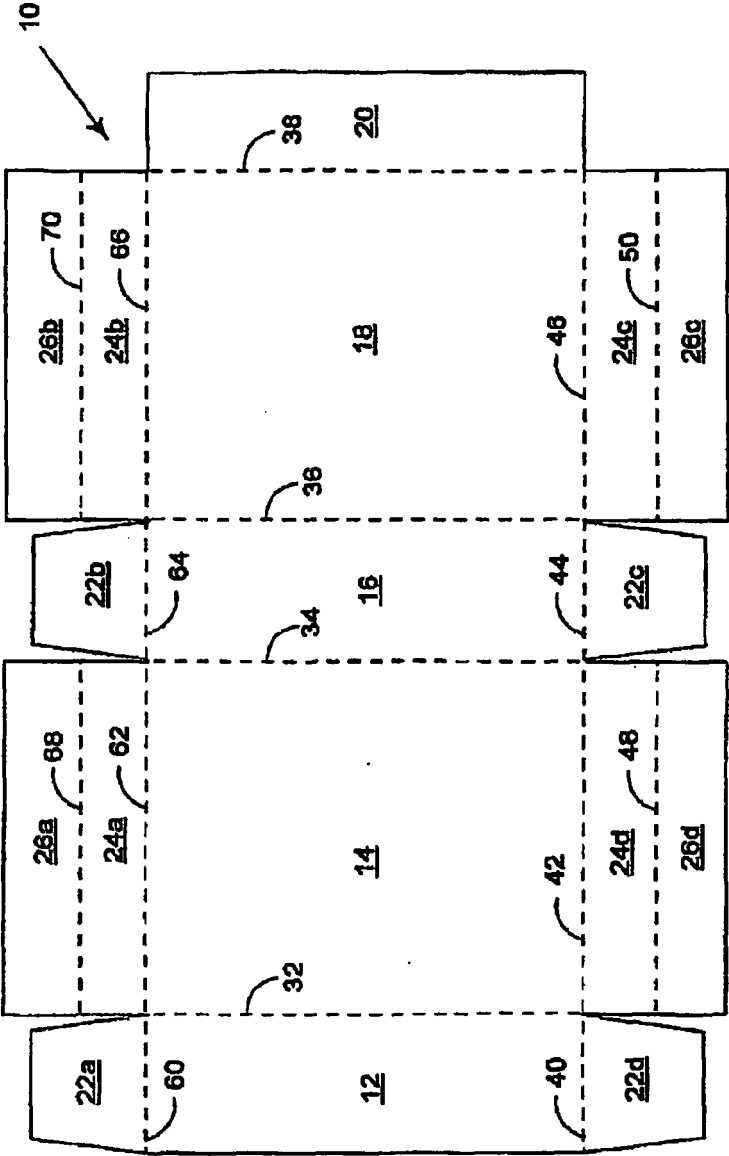


FIGURE 1

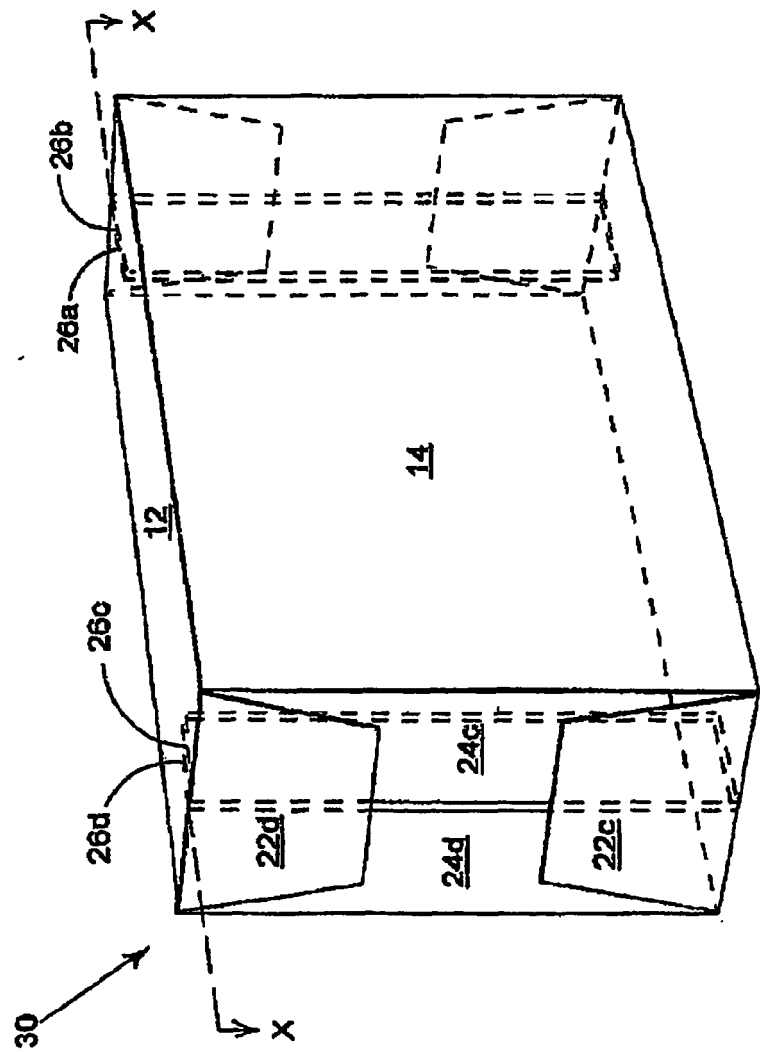


FIGURE 2

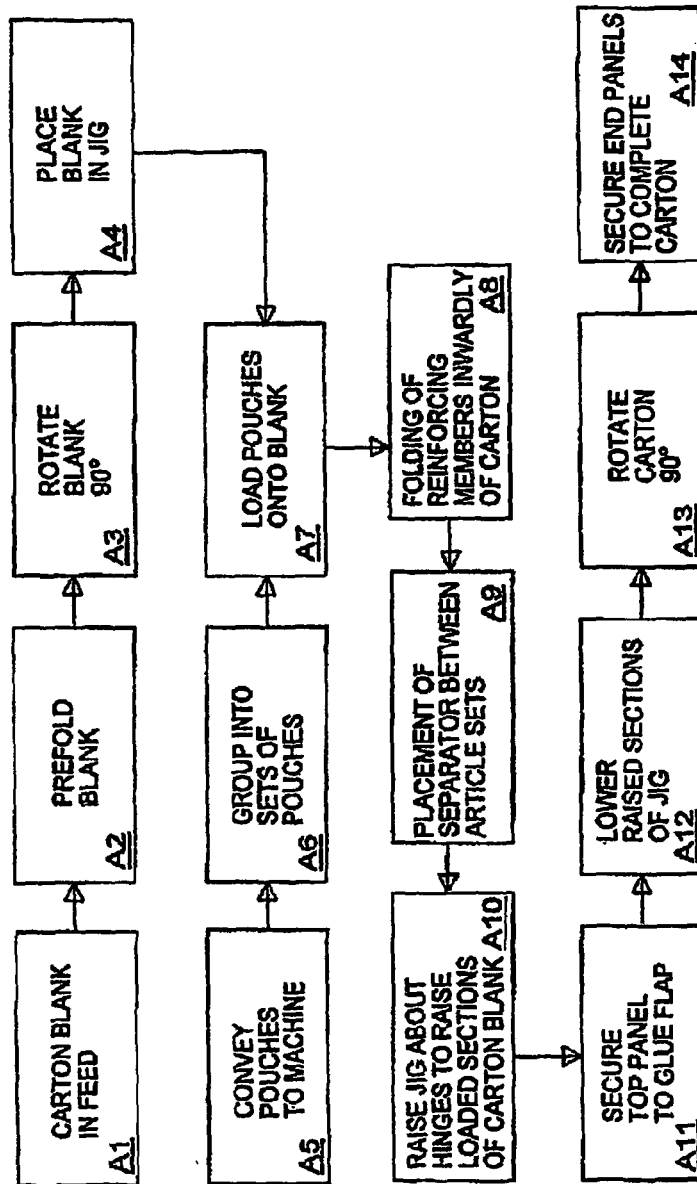


FIGURE 3

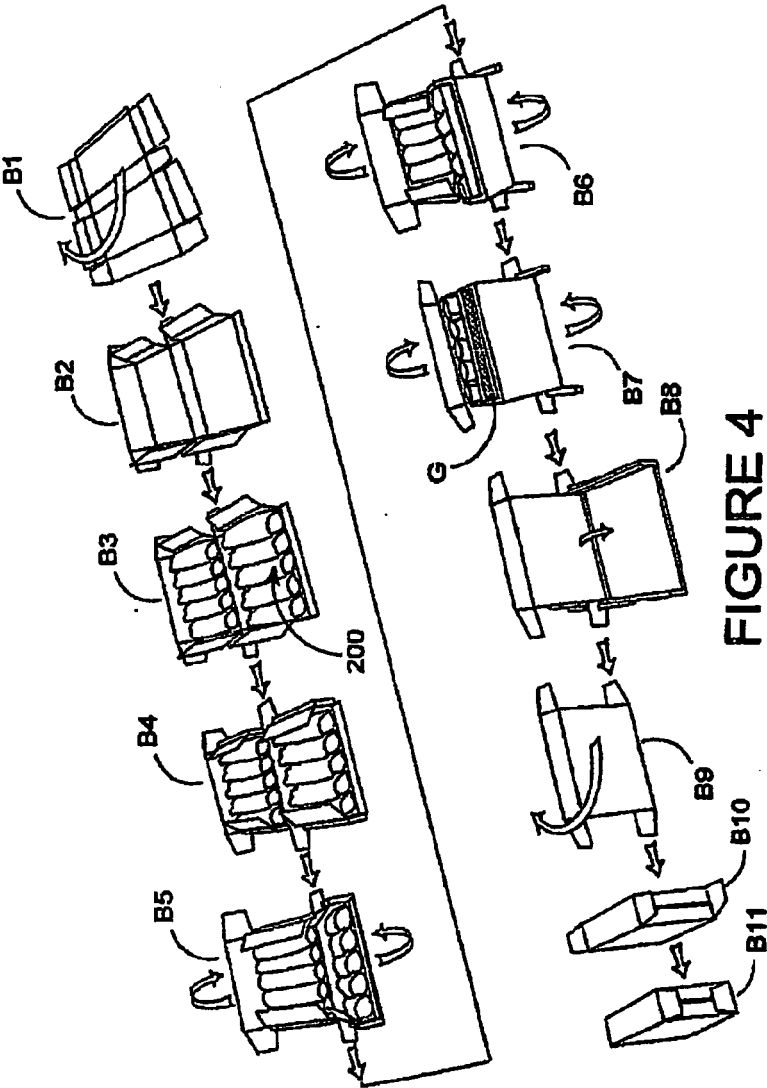
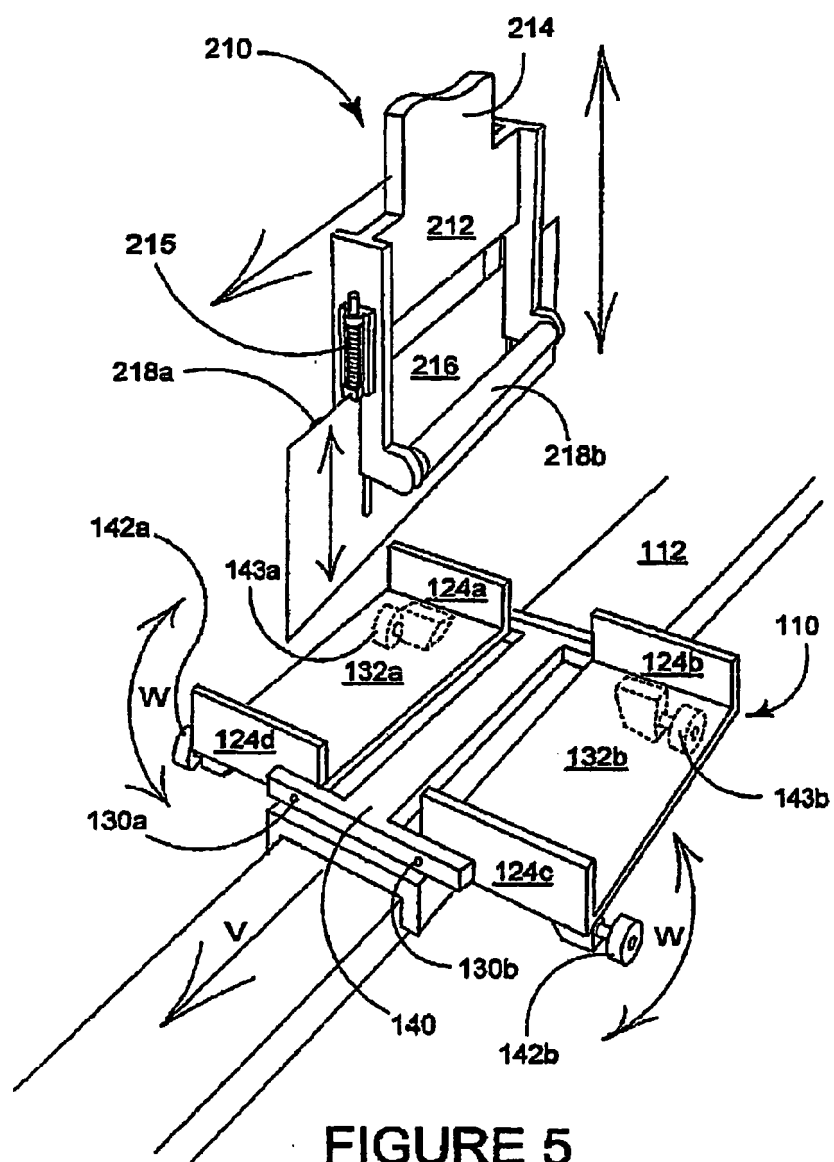


FIGURE 4



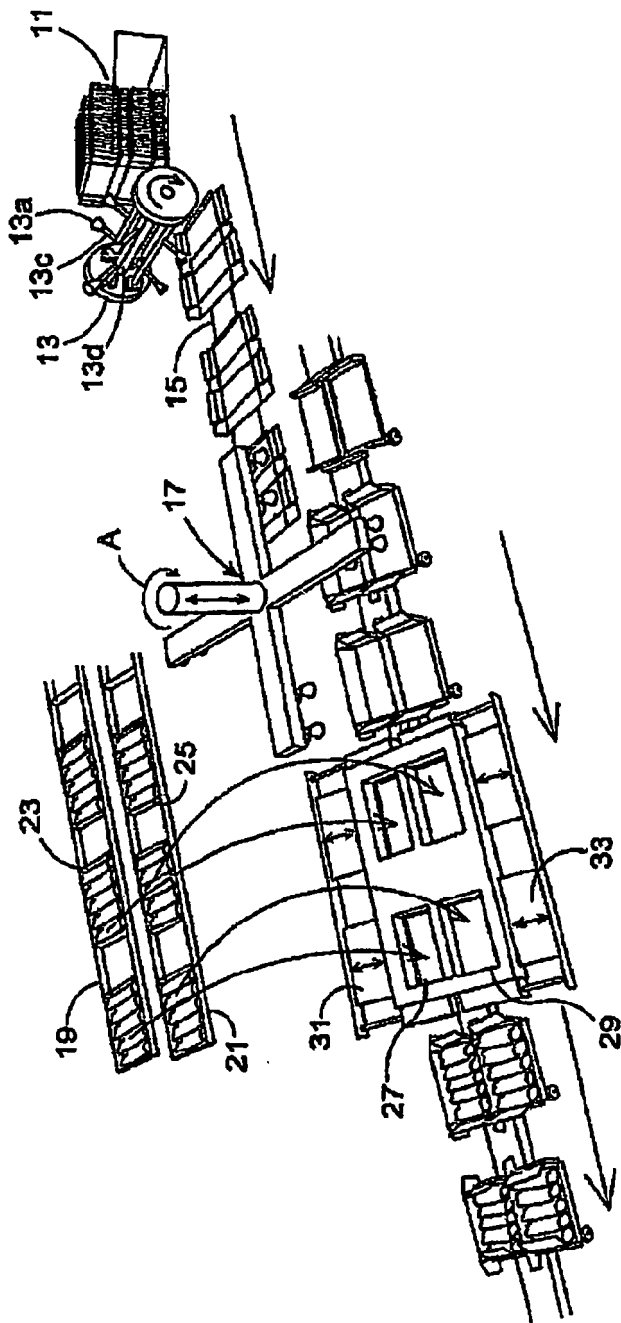


FIGURE 6

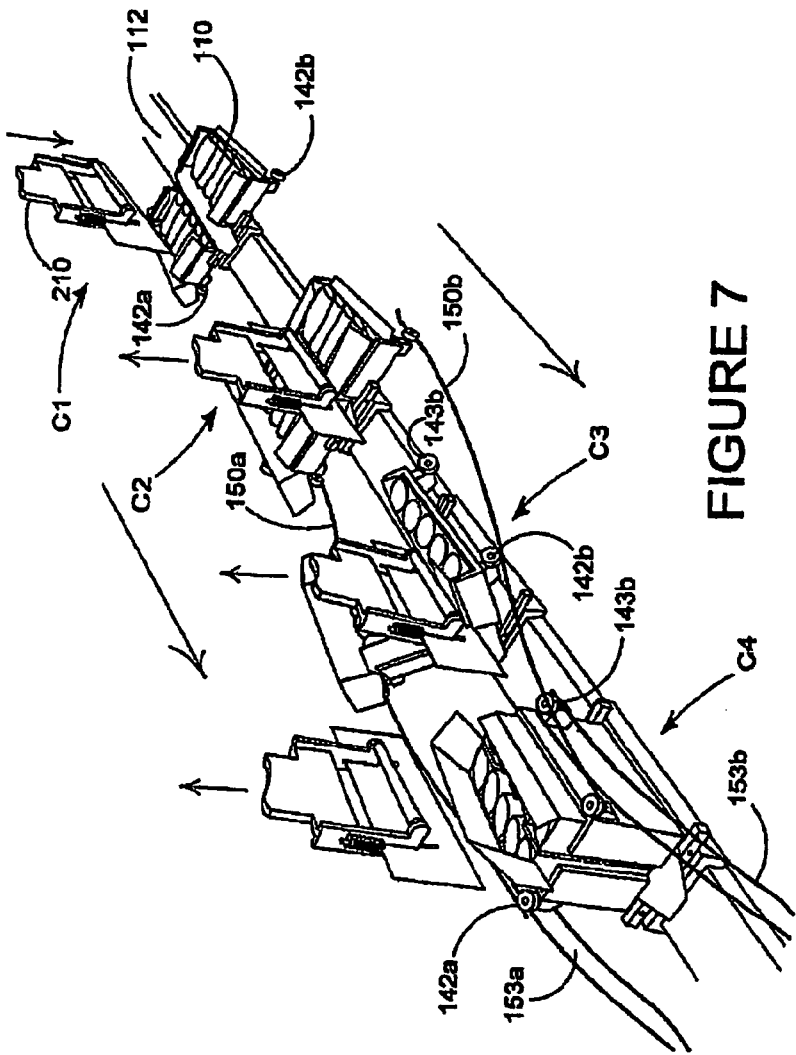


FIGURE 7

REFERENCES CITED IN THE DESCRIPTION

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