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APPARATUS AND METHOD FOR FEEDING AND ERECTING CARTONS
VORRICHTUNG UND VERFAHREN ZUM ZUFÜHREN UND ERRICHTEN VON CARTONS
DISPOSITIF ET PROCÉDE D'ACHEMINEMENT ET DE MONTAGE DE CARTONS

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References cited:
US-A- 2 984 162
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Description

Background of the Invention

[0001] This invention is concerned with carton manipulation and feeder apparatus.

[0002] This invention relates to packaging of primary articles in sleeve type cartons and is more particularly concerned with a carton feed and transfer apparatus arranged to feed such cartons in collapsed condition from a hopper and for initiating a set up operation of the cartons in sequence, before transferring the partially set up carton to the infeed end of a packaging machine.

[0003] US-A-3,575,409 discloses a carton feeder mechanism wherein motion of the cooperating parts is basically rotary in nature and without sharp and sudden changes in the direction or movement of the parts so as to accommodate high speed operation of the mechanism.

[0004] US-A-3,991,660 discloses a carton expander mechanism for sequentially manipulating collapsed open ended sleeve type cartons out of a hopper and into set up open ended condition by a main feeder arm for sequentially engaging a lower carton wall to withdraw the associated carton from the hopper together with a supplementary feeder arm pivotally mounted on the main feeder arm and arranged with an end portion thereof adapted to project through an aperture in the lower carton wall so as to engage an upper carton face contacting wall thereby to move such wall away from the lower wall to facilitate setting up the collapsed carton.

[0005] US-A-4,537,587 discloses a carton opening mechanism in which a first set of vacuum cups withdraws a collapsed carton from a hopper and swings such carton over into firm engagement with a second set of suction cups so as to condition the collapsed carton for a set up operation. In this patent, it would appear that transverse rotary movement of the first set of cups is tangential rather than radial relative to the carton to be picked up and that the cups would tend to slide along the wall of the carton in the hopper and thus might interfere with the appearance of the carton or with the efficiency of the set up operation. In this patent, the second cups do not move in a direction away from the first suction cups in order to set up the cartons.

[0006] US-A-4,605,393 discloses a carton blank removal, erection and transfer apparatus in which a rotatable element is mounted on a shaft which in turn is mounted on an arm which is pivotally mounted at an end thereof remote from the shaft on which the rotatable pick-up device is mounted. In this arrangement, rotation of the suction cups tends to blenheim the cartons and pick-up operation is impaired by sliding movement of the suction cups along the wall of the carton to be picked up.


[0008] A problem associated with the prior art is that the throughput of the machine is often restricted by the speed of the hopper. The present invention and its preferred embodiments seek to overcome or at least mitigate the problems of the prior art.

Summary of the Invention

[0009] According to one aspect of the invention there is provided an apparatus for sequentially withdrawing from a carton feed hopper collapsed cartons, each having oppositely disposed panels and for initiating set up of the withdrawn cartons, the apparatus comprising carton pick-up means for engaging one of the opposed panels of each successive carton and for withdrawing that carton from the hopper, means for transferring the carton orbitally about a primary axis from the hopper to an infeed end of a packaging machine, wherein panel engaging means is provided for engaging the opposite of the oppositely disposed panels, the panel engaging means being mounted upon a rotatable member for rotation upon the transfer means and being adapted to rotate about a supplementary axis spaced from but generally parallel to the primary axis, characterized in that the panel engaging means is adapted to be rotated such that an engaging surface of the engaging means is moved from a position substantially opposing an engaging surface of the pick up means to a position adjacent the engaging surface of the pick up means such that the panel engaging means may be drawn within the path of orbit of the carton pick up means so as to pull the opposite panel in a direction away from the the carton pick up means thereby to initiate opening of the carton.

[0010] Preferably, the panel engaging means are constructed and arranged to disengage from said other panel when said carton has been opened to a predetermined level. The panel engaging means may be adapted to withdraw closer into the path of orbit after disengaging from said other panel.

[0011] The carton pick-up means are preferably mounted upon a rotatable member mounted for rotation upon said means for transferring about a secondary axis spaced from but generally parallel to said primary axis.

[0012] In a preferred arrangement, the means for transferring may comprise a rotor mounted for rotation about the primary axis. In the rotor, the carton pick-up means and the panel engaging means are mounted. Conveniently, the panel engaging means include at least one vacuum cup. Such at least one vacuum cup is preferably mounted upon a rotatable vacuum tube.

[0013] Preferably the means for transferring includes a primary fixed cam housing defining a primary orbital cam track and a secondary fixed cam housing defining a secondary orbital cam track, wherein the primary orbital cam track defines orbital motion of the carton pick-up means, and the secondary orbital cam track defines orbital motion of the panel engaging means.

[0014] Conveniently the carton pick-up means and the...
panel engaging means can be connected respectively to primary and secondary cam followers which engage the respective cam tracks in a manner to define their said orbital motion.

[0015] The carton pick-up means may comprise an array of vacuum cups affixed to an elongate arm. Conveniently, the carton pick-up means and the panel engaging means may be vacuum operated and in communication with a common vacuum interrupter.

[0016] Preferably the apparatus is arranged, in use, to at least partially open the carton by more than 90 degrees preferably up to about 120 degrees to indicate folds in the carton to be formed and to prevent the partially set up carton from reverting to its original shape.

[0017] Preferably, the secondary fixed cam housing is mounted concentrically within the primary fixed cam housing in relation to the primary axis.

[0018] A second aspect of the invention provides a method of forming a carton comprising the steps of withdrawing from a carton feed hopper collapsed cartons having oppositely disposed panels and for initiating set up thereof; sequentially engaging one of the opposed panels using a carton pick up means and withdrawing from the hopper a collapsed carton which includes the one panel, transferring the carton orbitally about a primary generally horizontal axis from the hopper to an infeed end of a packaging machine, characterized by engaging another of the panels using a panel engaging means wherein the panel engaging means is rotated such that an engaging surface of the panel engaging means is moved from a position substantially opposing an engaging surface of the pick up means to a position adjacent the engaging surface of the pick up means, such that the panel engaging means may be drawn with the path of orbit of the carton pick up means, in a manner to pull the other panel in a direction away from the the carton pick up means so as to initiate opening of the carton.

Brief Description of the Drawings

[0019] In order that the invention may be illustrated, more easily appreciated and readily carried into effect by those skilled in the art, a preferred embodiment of the invention will now be described purely by way of non-limiting example with reference to the accompanying drawings, wherein:

FIGURE 1 is an isometric view of one embodiment of an orbital carton manipulation and feeding apparatus;

FIGURE 2 is a schematic illustration of the orbital tracks of the carton manipulation and feeding apparatus, about the axis of the rotatable shaft.

FIGURE 3 corresponds to the arrangement of Figure 2 but wherein the carton pick-up means has progressed in the direction of arrow A to an initial carton opening configuration;

FIGURE 4 also corresponds generally with the Figure 2 configuration, but wherein the carton has become erected to a larger extent;

FIGURE 5 is a schematic illustration of the orbital tracks of the carton manipulation and feeding apparatus representing a further stage in orbital transfer beyond the Figure 4 arrangement, wherein a substantially unfolded, erected carton is being transferred to a belt conveyor at the infeed end of a packaging machine;

FIGURE 6 is an isometric view of a second embodiment of an orbital carton manipulation and feeding apparatus;

FIGURE 7 is a schematic illustration of the orbital tracks of the carton manipulation and feeding apparatus, about on the axis of the rotatable shaft of the apparatus of Figure 6 with fixed cam housing removed;

FIGURE 8 corresponds to the arrangement of Figure 6 but wherein the carton pick-up means has progressed in the direction of arrow A to an initial carton opening configuration;

FIGURE 9 also corresponds generally with the Figure 6 configuration, but wherein the carton has become erected to a larger extent; and

FIGURE 10 is a schematic illustration of the orbital tracks of the carton manipulation and feeding apparatus representing a further stage in orbital transfer beyond the Figure 8 arrangement, wherein a substantially unfolded, erected carton is being transferred to a belt conveyor at the infeed end of a packaging machine.

Detailed Description of the Preferred Embodiments

[0020] Referring to the drawings and first, to the embodiment of Figure 1 thereof, an orbital carton manipulation and feeding apparatus is shown, wherein a carton hopper of flat partially assembled carton blanks is present but not shown in the interests of clarity. The cartons fed from the hopper, (not shown), are initially in collapsed form as shown by carton 16 although the cartons become attached to an array of vacuum cups as at 16a to effect withdrawal from the hopper.

[0021] The cartons have oppositely disposed flat panels comprising initially front and rear surfaces, each surface of which comprises two adjacent flat panels of the carton. As will be described in more detail hereafter, in the illustrated embodiment the carton pick-up means comprises an assembly of vacuum cups secured to a
support affixed to an elongate vacuum tube capable of rotation. When the assembly of vacuum cups is in the appropriate position to engage an underneath surface panel of the carton 16, vacuum is applied whereby further rotation of the apparatus causes the carton positively to be withdrawn from the carton feed hopper. The means for transferring the carton orbitally comprises a motor driven rotor mounted for rotation about the primary axis.

The assembly of vacuum cups holds the carton in position as required during further orbital movement of the rotor, until the carton has been partially opened whereby the carton becomes ready for transfer to the infeed end of the packaging machine. Four supplementary individually mounted vacuum cups also located on the rotor act upon an outer surface panel of the carton 16 to cause that panel to be moved away from the underneath oppositely disposed panels to commence unfolding of the carton. In this embodiment, each supplementary vacuum cup acts as the panel engaging means and all being situated within the path of orbit of the apparatus.

The carton manipulation apparatus illustrated in Figure 1 includes a pair of upstanding support legs 1, 2 in which a main rotatable shaft 3 is mounted for rotation in suitable bearings 4 of known type and located at the upper-most ends of the support legs 1 and 2. A cylindrical vacuum interrupter 5 of known type is located around the shaft 3 adjacent the primary support leg 1. An orbital rotor 6 is mounted for rotation with the main shaft 3 and, in this embodiment, has four arms extending radially from its central structure attached to the shaft 3. Four radially spaced supporting blocks 7 are mounted in the central structure of the rotor, and to each of which a pick-up arm 8 is connected. Each of the four pick-up arms 8 carry vacuum cup supports 10 and vacuum cups 11 in an array of four such vacuum cups 11. The vacuum cups 11 are in communication, through known means, with the vacuum interrupter 5.

The four arms of the orbital rotor 6 are further provided at an outer region with supporting blocks 7a, each of which carries a supplementary arm 8a, provided with a supplementary vacuum cup 11a. In the embodiment of Figure 1, there is shown four vacuum cups 11a, each are similarly in communication through known means with the vacuum interrupter 5.

Each support block 7 is mounted for rotation through an aperture (not shown) of the rotor 6. For example, a spigot (not shown) can project from one side of the supporting block 7 through the aperture (not shown) to the cam plate at the remote side thereof. Similarly, supplementary support blocks 7a, are mounted for rotation within the orbital rotor 6, e.g. by means of a spigot projecting through the respective apertures (not shown) in the rotor 6 and also affixed to a cam plate. Such spigots are offset from the longitudinal axis of the vacuum tube 8a so each tube 8a is capable of rotation independently about its spigot in a manner to be determined by rotation of the rotatable shaft 3.

The supporting block 7a shown at the upper part of Figure 1, at the remote side of the rotor 6, is secured to a cam plate 12 including two cam followers (although only one of which 17 is shown), e.g. a wheel or roller can be used as the cam follower located within an indented orbital cam track 14 in the secondary fixed cam housing 13. Although not apparent from Figure 1, the mounting arrangement for pick-up arms 8 on which the carton pick-up means 9, 10, 11 are located is similar in that a corresponding spigot projects through other apertures in the central port of the rotor 6 connected to a cam plate having cam followers engaging a primary orbital cam track of a primary fixed cam housing.

The main rotatable shaft 3 is driven by a motor 15, e.g. a linear servo motor, which causes the orbital rotor to rotate about the primary axis of the shaft 3 to provide corresponding motion of the central port of the rotor 6 connected to a cam plate having cam followers engaging a primary orbital cam track of a primary fixed cam housing.

The main rotatable shaft 3 is driven by a motor 15, e.g. a linear servo motor, which causes the orbital rotor to rotate about the primary axis of the shaft 3 to provide corresponding motion of each of the four carton pick-up means and each of the four associated panel engaging means as the rotor orbits the fixed cam housings causing rotation and displacement of the arms 8 and 8a, according to the paths of the indented cam tracks in the two fixed cam housings.

Referring to Figure 2 of the drawings, there is shown an arrangement depicting the orbital tracks of the main vacuum cup housing 9 including the four arrays of vacuum cups 11 attached thereto, and the orbital path A of the four supplementary vacuum cups 11a. Around the main rotating shaft 3, a fixed bracket 20 is provided in which a connecting rod 19 is slidably mounted. The connecting rod is attached to the main vacuum housing 9 and permits radial displacement of the main housing 9 in addition to its rotational motion. Such radial displacement is depicted by arrow B. The vacuum cups 11 attach by vacuum force to carton 16 so as to withdraw such carton from a corresponding hopper (not shown). The main vacuum cup housing 9 is connected to a main cam plate 18 through which spindles 21 and 22 pass and connected on the remote side to cam followers (not shown).

Cam plate 18 is not only rotated about the axis of the main rotating shaft 3 but is also adapted to rotate in a direction shown by arrow C according to the respective cam track 21a in which cam follower on spindle 21 is located and track 22a in which cam follower on spindle 22 is located. The orbital routes followed by the supplementary vacuum cup 11a is depicted generally by the paths 11b and 11c. The boundary between the inner primary fixed cam housing and outer secondary fixed cam housing is depicted generally at 27.

Beneath the orbital carton manipulation and transfer means, there is provided a transfer belt 23 arranged in the direction of the infeed end of a conveyor
track 24 upon which the at least partially unfolded cartons are to be transferred.

[0031] With reference to Figure 3, the orbital rotor (not shown) has traveled further in the direction of arrow A whereby the main vacuum cups 11 have been withdrawn towards the interior of the assembly whilst the carton 16 is still attached thereto in a generally flat condition. In this configuration the supplementary vacuum cup 11a (not referenced) has become rotated in the direction of arrow D so that it can apply a vacuum force to an externally disposed panel of the carton 16. The orientation of the main cam plate 18 is such that the cam followers (not shown) attached to the remote ends of the spindles 21 and 22 are now following generally the same part of the track (21a, 22a) simultaneously causing the slidable rod 19 to be displaced linearly within its mounting in the bracket 20. In the Figure 3 configuration, the apparatus approaches a stage where the carton is about to become partially opened before transfer on to the transfer belt 23. Fixed plates or lugs 25 and 26 are shown embedded in the conveyor track 24 to receive the at least partially unfolded carton as subsequently described.

[0032] With reference to the Figure 4 configuration the orbital arm (not shown) has rotated still further in the direction of arrow A and the supplementary vacuum cup 11a (not referenced) has become rotated clockwise in the direction D causing an at least partial opening of the carton 16a. The position of the main vacuum cup holder 9 radially corresponds generally with the arrangement in Figure 3 as such displacement is effectively controlled by the cam tracks in which the cam followers (not shown) attached to the spindles 21 and 22 are engaged. The partially unfolded carton 16a approaches still closer to the transfer belt 23 in this arrangement.

[0033] With reference to Figure 5, the orbital rotor (not shown) has continued its rotary motion to a further stage whereby the supplementary vacuum cup 11a detaches itself from the panel to which it was attached (in Figure 4) and becomes separated from the opened carton 16a by virtue of the track 11b followed by the vacuum tube (8a in Figure 2). The main vacuum cup holder 9 is about to be further withdrawn radially towards the primary axis of the main shaft 3 whilst the carton 16a becomes engaged between the lugs or plates 25 and 26 at the infeed end of the conveyor 24. Accordingly upon still further rotation of the orbital rotor (not shown) the supplementary vacuum cup 11a becomes fully disengaged and withdrawn closer into the primary axis of the assembly, the vacuum supplied to the main vacuum cups 11 is disconnected and these vacuum cups also become withdrawn closer into the primary axis of the main rotating shaft 3 thereby becoming detached from the opened carton which by then has become engaged between the lugs or plates 25 and 26 moving in the direction of arrow E at the infeed end of conveyor 24, for insertion of product or other processing.

[0034] The second embodiment of the orbital carton manipulation and feed apparatus is shown in Figures 6 to 10. The apparatus is similar to the first embodiment in many respects and, therefore, like reference numerals have been used, with the prefix “1”.

[0035] In the second embodiment, the panel engaging means is positioned in advance of the carton pick-up means, so as to engage a leading edge of the collapsed carton 116. (In the first embodiment, the engaging means contacts a trailing face of carton.)

[0036] As illustrated in Figure 6, the four arms of the orbital rotor 16 are further provided at an outer region with supporting blocks 17a, each of which carries a supplementary arm 18a, provided with a supplementary vacuum cup 111a. In the embodiment of Figure 6, four vacuum cups 111a are similarly in communication through known means with the vacuum interrupter 15.

[0037] Each of the four pick-up arms 18 carry vacuum cup supports 110 and vacuum cups 111, in this embodiment, in an array of two such vacuum cups 111. Again, the vacuum cups 111 are in communication through known means with the vacuum interrupter 15. It will be seen from Figure 6 that the supplementary vacuum cup 111a is positioned ahead of vacuum cups 111 in the direction of motion, so that the supplementary vacuum cup 111a can engage the leading face of the carton 116.

[0038] The remaining features of the apparatus according to the second embodiment shown in Figure 6, correspond to those features illustrated in Figure 1 and are described in the preceding paragraphs.

[0039] Referring to Figure 7 of the drawings, there is shown an arrangement depicting the orbital tracks of the main vacuum cup housing 19 including the four arrays of vacuum cups 111 attached thereto, and the orbital path A of the four supplementary vacuum cups 111a. Around the main rotating shaft 13, a fixed bracket 120 is provided in which a connecting rod 119 is slidably mounted. The connecting rod is attached to the main vacuum housing 19 and permits radial displacement of the main housing in addition to its rotational motion. Such referring to Figure 7 of the drawings, there is shown an arrangement depicting the orbital tracks of the main vacuum cup housing 19 including the four arrays of vacuum cups 111 attached thereto, and the orbital path A of the four supplementary vacuum cups 111a. Around the main rotating shaft 13, a fixed bracket 120 is provided in which a connecting rod 119 is slidably mounted. The connecting rod is attached to the main vacuum housing 19 and permits radial displacement of the main housing in addition to its rotational motion. Such radial displacement is depicted by arrow B. The vacuum cups 111 attach by vacuum force to cartesian 116 so as to withdraw such carton from a corresponding hopper (not shown). The main vacuum cup housing 19 is connected to a main cam plate 118 through which spindles 121 and 122 pass and connected on the remote side to cam followers (not shown). Cam plate 118 is not only rotated about the axis of the main rotating shaft 13 but is also adapted to rotate according to the respective cam track 121a in which cam
follower on spindle 121 is located and track 122a in which cam follower on spindle 122 is located. The orbital route followed by the supplementary vacuum cup 111a is depicted generally by the paths 111b and 111c. The boundary between the inner primary fixed cam housing and outer secondary fixed cam housing is depicted generally at 127.

[0040] Beneath the orbital carton manipulation and transfer means, there is provided a transfer belt 123 arranged in the direction of the infeed end of a conveyor track 124 upon which the at least partially unfolded cartons are to be transferred.

[0041] With reference to Figure 8, the orbital rotor (not shown) has traveled further in the direction of arrow A' whereby the main vacuum cups 111 have been withdrawn towards the interior of the assembly whilst the carton 116 is still attached thereto in a generally flat condition. In this configuration the supplementary vacuum cup 111a is rotated in the direction of arrow D' so that it can apply a vacuum force to an externally disposed leading panel of the carton 116. The orientation of the main cam plate 118 is such that the cam followers (not shown) attached to the remote ends of the spindles 121 and 122 are now following generally the same part of the track (121a, 122a) simultaneously causing the slideable rod 119 to be displaced linearly within its mounting in the bracket 120. In the Figure 9, the apparatus approaches a stage where the carton is about to become partially opened before transfer on to the transfer belt 123. Fixed plates or lugs 125 and 126 are shown embedded in the conveyor track 24 to receive the at least partially unfolded carton as subsequently described.

[0042] With reference to the Figure 9 configuration the orbital arm (not shown) has rotated still further in the direction of arrow A’ and the supplementary vacuum cup 111a (not referenced) has become rotated clockwise in the direction D1 causing an at least partial opening of the carton 116a. The position of the main vacuum cup holder 19 radially corresponds generally with the arrangement in Figure 8, but the cam plate 118 is caused to be moved out of alignment with rod 119 such as displacement is effectively controlled by the cam tracks in which the cam followers (not shown) attached to the spindles 121 and 122 are engaged. The partially unfolded carton 116a approaches still closer to the transfer belt 123 in this arrangement.

[0043] With reference to Figure 10, the orbital rotor (not shown) has continued its rotary motion to a further stage whereby the supplementary vacuum cup 111a detaches itself from the panel to which it was attached (in Figure 9) and becomes separated from the opened carton 116a by virtue of the track 111b followed by the arm (18a in Figure 7). The main vacuum cup holder 19 is about to be further withdrawn radially towards the primary axis of the main shaft 13 whilst the carton 116a becomes engaged between the lugs or plates 125 and 126 at the infeed end of the conveyor 124. Accordingly, upon still further rotation of the orbital rotor (not shown) the supplementary vacuum cup 111a becomes fully disengaged and withdrawn closer into the primary axis of the assembly in direction D1. The vacuum supplied to the main vacuum cups 111 is disconnected and these vacuum cups also become withdrawn closer into the primary axis of the main rotating shaft 13 thereby becoming detached from the opened carton which by then has become engaged between the lugs or plates 125 and 126 moving in the direction of arrow E at the infeed end of conveyor 24, for insertion of product or other processing.

[0044] The present arrangement provides a number of advantages over known such arrangements for withdrawing cartons from feed hoppers and transferring them orbitally in that it is possible to avoid the complexity, cost and synchronization of carton-opening components situated outside of the orbital path of the carton blanks by deploying supplementary vacuum cups which can be affixed to the same rotor as the main carton withdrawing vacuum cups through use of a supplementary fixed cam housing to define their motion. Also as is apparent particularly from the Figures 3 and 9 arrangement the supplementary vacuum cup 11a and 111a engages a minimum edge part of the carton to assist in partial opening thereof to minimize the risk of such vacuum cup sliding on or unintentionally disengaging from the surface panel including that edge.

[0045] Such an arrangement in consequence can provide a further level of improved operation at higher speeds than similar known such equipment which can lead to efficiencies in the packaging process;

Claims

1. An apparatus for sequentially withdrawing from a carton feed hopper collapsed cartons (16, 16a, 116, 116a), each having oppositely disposed panels and for initiating set up of the withdrawn cartons, the apparatus comprising carton pick-up means (11, 111) for engaging one of the opposed panels of each successive carton and for withdrawing that carton from the hopper, means for transferring (15, 115) said carton orbitally about a primary axis from said hopper to an infeed end (24, 124) of a packaging machine, wherein panel engaging means (11a, 111a) is provided for engaging another of said oppositely disposed panels, the panel engaging means being mounted upon a rotatable member (7a 17a) for rotation upon the transfer means and being adapted to rotate about a supplementary axis spaced from but generally parallel to said primary axis, characterized in that said panel engaging means is adapted to be rotated such that an engaging surface of the engaging means is moved from a position substantially opposing an engaging surface of the pick up means to a position adjacent the engaging surface of said pick up means such that the panel engaging means may be drawn within the path of orbit
of the engaging surface of the carton pick up means so as to pull said other of said oppositely opposed panels in a direction away from the said carton pick up means thereby to initiate opening of the carton.

2. An apparatus as claimed in claim 1, wherein said panel engaging means are constructed and arranged to disengage from said other panel when said carton has been opened to a predetermined level.

3. An apparatus as claimed in claim 2, wherein said panel engaging means are adapted to withdraw closer into the path of orbit after disengaging from said other panel.

4. An apparatus as claimed in any preceding claim wherein said carton pick-up means are mounted upon a rotatable member (18, 118) mounted for rotation upon said means for transferring about a secondary axis spaced from but generally parallel to said primary axis.

5. An apparatus as claimed in any preceding claim wherein said means for transferring comprises a rotor (6, 16) mounted for rotation about said primary axis, and in which rotor said carton pick-up means and said panel engaging means are mounted.

6. An apparatus as claimed in any preceding claim wherein said panel-engaging means includes at least one vacuum cup (11a, 111a).

7. An apparatus as claimed in claim 6 wherein said at least one vacuum cup is mounted upon a rotatable arm (8a, 18a).

8. An apparatus as claimed in any preceding claim wherein said means for transferring includes a primary fixed cam housing (13, 113) defining a primary orbital cam track (21a, 22a, 121a, 122a) and a secondary fixed cam housing (13, 113) defining a secondary orbital cam track, wherein the primary orbital cam track defines orbital motion of the carton pick-up means, and the secondary orbital cam track (11b, 11c, 111b, 111c) defines orbital motion of the panel engaging means.

9. An apparatus as claimed in claim 8 wherein said carton pick-up means and said panel engaging means are connected to primary and secondary cam followers (17, 117) which engage said cam tracks in a manner to define their said orbital motion.

10. An apparatus as claimed in any preceding claim wherein said carton pick-up means comprises an array of vacuum cups (11, 111) affixed to an elongate vacuum tubular member (10, 110).

11. An apparatus as claimed in any preceding claim wherein said carton pick-up means and said panel engaging means are vacuum operated and in communication with a common vacuum interrupter (5, 15).

12. An apparatus as claimed in any preceding claim constructed and arranged, in use, to open the carton by more than 90° preferably up to about 120° to indicate folds in the carton to be formed and to prevent the partially set up carton from reverting to its original shape.

13. An apparatus as claimed in any one of claims 8 to 12 wherein the secondary fixed cam housing is mounted concentrically with the primary fixed cam housing in relation to the primary axis.

14. A method of forming a carton (16, 16a, 116, 116a) comprising the steps of withdrawing from a carton feed hopper collapsed cartons having oppositely disposed panels, and for initiating set up thereof; sequentially engaging one of said opposed panels using a carton pick up means (11, 111) and withdrawing from the hopper a collapsed carton which includes said one panel, transferring said carton orbitally about a primary generally horizontal axis from said hopper to an infed end (24, 124) of a packaging machine, characterized by engaging another of said panels using a panel engaging means (11a, 111a) wherein said panel engaging means is rotated such that an engaging surface of the panel engaging means is moved from a position substantially opposing an engaging surface of the pick up means to a position adjacent the engaging surface of said pick up means, such that the panel engaging means may be drawn with the path of orbit of the carton pick up means, in a manner to pull said other panel in a direction away from the said carton pick up means so as to initiate opening of the carton.

Patentansprüche

1. Vorrichtung zur sequenziellen Entnahme von zusammengelegten Schachteln (16, 16a, 116, 116a) aus einem Schachtelzuführmagazin, wobei jede Schachtel gegenüberliegend angeordnete Wandflächen aufweist, sowie zum Einleiten des Aufrichtens der entnommenen, Schachteln, wobei die Vorrichtung Schachtelaufnahmemittel (11, 111) umfasst, um eine der gegenüberliegenden Wandflächen jeder sukzessiven Schachtel in Eingriff zu nehmen und um diese Schachtel aus dem Magazin zu entnehmen, Mittel zum Überführen (15, 115) der Schachtel orbital um eine Hauptsachse von dem Magazin zu einem Einspeisungsende (24, 124) einer Verpackungsmaschine, wobei Wandflächeneingriffsmittel.
(11a, 111a) bereitgestellt sind, um eine andere Wandfläche der gegenüberliegend angeordneten Wandflächen in Eingriff zu nehmen, wobei die Wandflächeneingriffsmittel auf einem rotierbaren Element (7a, 17a) für eine Rotation auf die Überführungsmittel angeordnet sind und ausgestaltet sind, um eine Hilfsachse zu rotieren, die von der Hauptachse be- abstandet ist, jedoch im Wesentlichen parallel zu dieser verläuft, dadurch gekennzeichnet, dass die Wandflächeneingriffsmittel ausgestaltet sind, derart rotiert zu werden, dass eine Eingriffsfläche der Eingriffsmittel von einer Position, die im Wesentlichen einer Eingriffsfläche der Aufnahmemitte gegenüberliegt, zu einer Position bewegt wird, die an die Eingriffsfläche der Aufnahmemitte angrenzt, so dass die Wandflächeneingriffsmittel in den orbitalen Pfad der Eingriffsfläche der Schachtelauflaufnahmemit- tel gezogen werden können, um die andere Wand-fläche der gegenüberliegend angeordneten Wandflächen in eine Richtung weg von den Schachtelaufnahmemiteln zu ziehen, um somit das Öffnen der Schachtel einzuleiten.

2. Vorrichtung nach Anspruch 1, wobei die Wandflächeneingriffsmittel ausgestaltet und angeordnet sind, sich von der anderen Wandfläche zu lösen, wenn die Schachtel bis zu einem vorbestimmten Grad geöffnet worden ist.

3. Vorrichtung nach Anspruch 2, wobei die Wandflächeneingriffsmittel ausgestaltet sind, sich weiter in den orbitalen Pfad zurückzuziehen, nachdem diese sich von der anderen Wandfläche gelöst haben.

4. Vorrichtung nach einem der vorhergehenden An- sprüche, wobei die Schachtelaufnahmemitte auf ei- nem rotierbaren Element (18, 118) angebracht sind, das für eine Rotation auf den Mitteln zum Überführen um eine Hilfsachse angebracht ist, die von der Hauptachse beabstandet ist, jedoch im Allgemeinen parallel zu dieser verläuft.

5. Vorrichtung nach einem der vorhergehenden An- sprüche, wobei die Mittel zum Überführen einen Ro- tor (6, 16) umfassen, der für eine Rotation um die Hauptachse angebracht ist, und wobei in dem Rotor die Schachtelaufnahmemitte und die Wandflächen- eingriffsmittel angebracht sind.

6. Vorrichtung nach einem der vorhergehenden An- sprüche, wobei die Wandflächeneingriffsmittel we- nigstens einen Saußnapf (11a, 111a) umfassen.

7. Vorrichtung nach Anspruch 6, wobei der wenigstens eine Saußnapf auf einem rotierbaren Arm (8a, 18a) angebracht ist.

8. Vorrichtung nach einem der vorhergehenden An- sprüche, wobei die Mittel zum Überführen einen fest- stehenden Hauptnockenrahmen (13, 113) umfas- sen, der eine orbitale Hauptnockenspur (21a, 22a, 121a, 122a) definiert, sowie einen feststehenden Hilfsnockenrahmen (13, 113), der eine orbitale Hilfsnockenspur definiert, wobei die orbitale Hauptnocken- spur die orbitale Bewegung der Schachtelauflaufnahmemitte definiert und die orbitale Hilfsnockenspur (11b, 11c, 111b, 111c) die orbitale Bewegung der Wandflächeneingriffsmittel definiert.

9. Vorrichtung nach Anspruch 8, wobei die Schachtelauflaufnahmemitte und die Wandflächeneingriffsmittel mit einem Haupt- und einem Hilfsnockenstößel (17, 117) verbunden sind, die die Nockenspuren derart in Eingriff nehmen, dass deren orbitale Bewegung definiert wird.

10. Vorrichtung nach einem der vorhergehenden An- sprüche, wobei die Schachtelauflaufnahmemitte eine Anordnung von Saugnäpfen (11, 111) umfasst, die an ein längliches, röhrenförmiges Vakuumelement (10, 110) angebracht sind.


12. Vorrichtung nach einem der vorhergehenden An- sprüche, wobei die Vorrichtung ausgestaltet und ange- ordnet ist, um im Gebrauch die Schachtel um mehr als 90°, vorzugsweise um bis zu ungefähr 120°, zu öffnen, um Faltungen in der Schachtel anzuzei- gen, um ausgebildet zu werden und die teilweise auf- gerichtete Schachtel daran zu hindern, zu ihrer ursprünglichen Form zurückzukehren.

13. Vorrichtung nach einem der Ansprüche 8 bis 12, wo- bei der feststehende Hilfsnockenrahmen konzen- trisch mit dem feststehenden Hauptnockenrahmen hinsichtlich der Hauptachse angebracht ist.

14. Verfahren zum Ausbilden einer Schachtel (16, 16a, 116, 116a), wobei das Verfahren die folgenden Schritte umfasst: Entnehmen zusammengelegter Schachteln, die gegenüberliegend angeordnete Wandflächen aufweisen, aus einem Schachtelzuführmagazin und Einleiten des Aufrichtens dieser Schachteln; sequenzielles In-Eingriffnehmen einer der gegenüberliegenden Wandflächen unter Ver- wendung von Schachtelauflaufnahmemiteln (11, 111) und Entnehmen einer zusammengelegten Schachtel aus dem Magazin, die die eine Wandfläche um- fasst; Überführen der Schachtel orbital um eine im Allgemeinen horizontale Hauptachse von dem Ma-
Revidications

1. Appareil pour retirer d’un trémie d’alimentation des cartons aplatis (16, 16a, 116, 116a), chacun ayant des panneaux disposés de manière opposée et pour entamer le déploiement des cartons retirés, l’appareil comprenant un moyen de ramassage des cartons (11, 111), pour prendre un des panneaux opposés de chaque nouveau carton et pour les ramasser du trémie d’alimentation, un moyen pour transférer (15, 115) lesdits cartons de manière orbitale autour d’un axe primaire dudit trémie à l’entrée d’alimentation (24, 124) d’une machine d’emballage, dans lequel appareil un moyen de prise (11a, 111a) est fourni pour prendre un autre de ces panneaux disposés de manière opposée, le moyen de prise de panneau étant monté sur un élément rotatif (7a, 17a) servant à tourner sur le moyen de transfert et étant adapté pour un mouvement de rotation de panneaux. Le moyen de prise de panneau est adapté pour être tourné de telle sorte qu’une surface de prise est déplacée d’une position sensiblement opposée à une surface de prise du moyen de ramassage à une position voisine de la surface de prise dudit moyen de ramassage de telle sorte que le moyen de prise de panneau puisse être retiré à l’intérieur du chemin orbital de la surface de prise du moyen de ramassage du carton de manière à tirer l’autre panneau opposé mentionné vers une direction à l’opposée du moyen de ramassage de cartons afin d’entamer l’ouverture du carton.

2. Appareil selon la revendication 1, dans lequel lesdits moyens de prise de panneaux sont construits et arrêtés pour se dégager dudit autre panneau lorsque ledit carton a été ouvert jusqu’à un niveau prédéterminé.

3. Appareil selon la revendication 2, dans lequel lesdits moyens de prise sont adaptés pour se retirer plus à l’intérieur du chemin orbital après s’être dégagés de l’autre dit panneau.

4. Appareil selon l’une quelconque des revendications précédentes, dans lequel lesdits moyens de ramassage de cartons sont montés sur un élément rotatif (18, 118) monté sur ledit moyen de transfert pour tourner autour d’un axe secondaire espacé au respect de mais généralement parallèle audit axe primaire.

5. Appareil selon l’une quelconque des revendications précédentes, dans lequel lesdits moyens de transfert comprennent un rotor (6,16) monté pour tourner autour dudit axe primaire et sur lequel rotor lesdits moyens de ramassage et de prise sont montés.

6. Appareil selon l’une quelconque des revendications précédentes dans lequel ledit moyen de prise de panneau comprend au moins une ventouse (11a, 11a).

7. Appareil selon la revendication 6 dans lequel au moins une desdites ventouses est montée sur un bras rotatif (8a, 18a).

8. Appareil selon l’une quelconque des revendications précédentes dans lequel le moyen de transfert comprend un logement à came primaire fixé (13, 113) définissant un chemin de roulement orbital primaire (21a, 22a, 121a, 122a) ainsi qu’un logement à came secondaire fixé, dans lequel le chemin de roulement orbital primaire définit le mouvement orbital du moyen de ramassage de cartons, et le chemin de roulement orbital secondaire (11b, 11c, 111b, 111c) définit le mouvement orbital du moyen de prise de panneau.

9. Appareil selon la revendication 8 dans lequel ledit moyen de ramassage de cartons et ledit moyen de prise de panneau sont raccordés à des galets de came primaire et secondaire (17, 117) qui suivent lesdits chemins de roulement pour définir leur dit mouvement orbital.

10. Appareil selon l’une quelconque des revendications précédentes dans lequel ledit moyen de ramassage de cartons comprend une série de ventouses (11, 111) affixées à un élément à vide tubulaire allongé (10, 110).

11. Appareil selon l’une quelconque des revendications précédentes dans lequel ledit moyen de ramassage de cartons et ledit moyen de prise de panneau sont commandés par dépression et communiquent avec un interrupteur à vide commun (5, 15).
12. Appareil selon l'une quelconque des revendications précédentes construit et arrangé, lors de son utilisation, pour ouvrir le carton sur un angle supérieur à 90°, de préférence, jusqu'à 120° pour indiquer les plis du carton à être formés et pour empêcher le carton partiellement déployé de récupérer sa forme originale.

13. Appareil selon l'une quelconque des revendications 8 à 12 dans lequel le logement à came secondaire fixé est monté concentriquement avec le logement à came primaire fixé par rapport à l'axe primaire.

14. Méthode servant à former un carton (16, 16a, 116, 116a) comprenant les étapes consistant à ramasser d'un trémie d'alimentation des cartons aplatis ayant des panneaux disposés de manière opposée et à entamer le déploiement desdits cartons; en prenant de manière séquentielle un desdits panneaux opposés moyennant un moyen de ramassage de cartons (11, 111) et en ramassant du trémie un carton aplati comprenant ledit panneau, en transférant ledit carton de manière orbitale autour d'un axe généralement horizontal dudit trémie à une entrée d'alimentation d'une machine d'emballage, caractérisée par la prise d'un autre desdits panneaux moyennant un moyen de prise de panneau (11a, 111a) dans lequel ledit moyen de prise de panneau est tourné de telle sorte qu'une surface de prise du moyen de prise est déplacée d'une position sensiblement opposée à une surface de prise du moyen de prise à une position voisine de la surface de prise du moyen de prise, de telle sorte que le moyen de prise de panneau puisse être retiré à l'intérieur du chemin orbital du moyen de ramassage de cartons, de manière à tirer ledit autre panneau vers une direction à l'opposée du moyen de ramassage de cartons afin d'entamer l'ouverture du carton.