

PRODUCT MULTI-PACK AND A SYSTEM FOR ORIENTING AND PACKAGING SUCH MULTI-PACKS

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is a continuation-in-part of U.S. application Serial No. 12/424,139 filed April 15, 2009.

BACKGROUND

1. Technical Field

10 One or more embodiments of the present invention generally relate to a product multi-pack for securing a plurality of oriented containers relative to each other, and a system for orienting and packaging such multi-packs.

2. Background Art

15 Container connectors for attaching a plurality of beverage containers, such as beer or soft drink cans, are well known. Such connectors are typically thin flexible sheets of plastic that include a series of apertures. Each aperture is sized for receiving a portion of the can. For example, common "six-pack" connectors include six apertures that are each engageable about an upper ridge of a can. Similar connectors have been used to hold bottles, and non fluid containers.

20 Container positioners have been incorporated into cardboard cartons, such as those currently used to display two ounce bottles of 5-hour ENERGY ® dietary supplements. Such container positioners include a cardboard panel having a series of apertures. Each aperture receives a cap of a bottle. The apertures provide frictional resistance that opposes the rotation of the bottles. The carton also includes a window to display the bottles. Once the bottles are placed in the carton, and are
25 engaged by the panel, they may be manually rotated to orient the bottle labels such that they are facing out of the window.

Systems for packaging and orienting beverage containers are also well known. U.S. Patent Nos.: 6,868,652 B2 to Arends et al., 5,074,399 to Kettle et al., and 5,215,180 to Allard et al. disclose examples of such prior art.

5 Systems for packaging beverage containers, that also include mechanisms for cutting container connectors are also well known. U.S. Patent Nos.: 3,991,640 to Schlueter, 6,973,760 B2 to Moore, 3,851,445 to Schuh and 5,054,257 to Cunningham et al. disclose examples of such prior art.

SUMMARY OF THE INVENTION

10 In at least one embodiment a product multi-pack is provided with a plurality of elongate product containers. The containers each include a bottom, an open top that is closed by a cap and a wall extending there between. The wall includes a label having a front portion extending about a limited section of the wall circumference. A carton is provided that is sized to display the plurality of product
15 containers retained therein. A locator web is provided that is formed of a thin sheet of plastic having a plurality of spaced apart apertures formed therein. The apertures are sized to be at least partially elastically deformed when installed over the caps of the product containers. Additionally, the locator web provides frictional resistance to rotation of the product containers, which enables the containers to be positioned and
20 held in place relative to the carton open face so that the label front portions are visible.

In another embodiment, a method of packaging at least two of generally circumferentially symmetrically shaped product containers provided with a label having a front portion extending about a limited section of the circumference in an
25 open face carton is provided. The method includes inserting an end of each of at least two product containers into one of a plurality of spaced apart apertures in a plastic web. Additionally the method includes optically sensing the orientation of the product containers. The method provides automatically rotating the product containers to a desired position based on the sensed orientation and the location of the label front
30 portion. The method also includes enclosing the at least two product containers and the interconnecting plastic web into an open face multi-pack carton so that the label

front portions of the plurality of product containers are oriented to be visible through the carton open face.

In another embodiment, a system is provided for filling a multi-pack carton with plurality of elongate generally circumferentially symmetrically shaped product containers. The containers each have a bottom region, an open top closed by a cap and a tubular wall extending there between, with the wall provided with a label having a front portion extending about a limited section of the wall circumference. The system includes a conveyor for conveying product containers through a series of stations. The system provides a controller for receiving signals from the stations, where the controller analyzes the received signals and transmits control signals to the stations in response to the received signals. The system also includes a feed station coupled to the conveyor for organizing product containers to be conveyed. A web application station is provided for installing thin elongate web to the conveyed product containers. The system includes a rotation sensor for measuring a product container indicator position that is indicative of a label orientation and transmitting a corresponding orientation signal to the controller. A product container alignment station is provided for receiving speed control signals from the controller and operating a pair of drive members in response to the received speed control signals for rotating a series of connected conveyed product containers. The system includes a feed sensor for measuring a longitudinal position of the container and transmitting a corresponding feed signal to the controller. A web cutting station is provided for receiving cut command signals from the controller and operating a cutting mechanism in response to the received cut command signals for separating the series of connected conveyed product containers into subassemblies of linked product containers. The system includes a carton feed station for receiving a plurality of carton blanks and erecting a carton from each blank. A transfer station is provided for receiving subassemblies of linked product containers and transferring linked product containers into each carton. And the system includes a carton closing station for closing the carton once filled.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a side perspective view of a product multi-pack according to an embodiment of the present invention;

FIGURE 2 is a side elevation view of a system for packaging a product multi-pack according to another embodiment of the present invention;

FIGURE 3 is an enlarged side elevation view of a product container of Figure 1;

FIGURE 4 is an enlarged side perspective view of the product container of Figure 1, illustrated with a removable top;

FIGURE 5 is a top plan view of an elongate web member for receiving the product container of Figure 3;

FIGURE 6 is a side elevation view of a carton blank of Figure 1;

FIGURE 7 is a side perspective view of a carton erected from the carton blank of Figure 6;

FIGURE 8 is a top perspective view of a product multi-pack according to another embodiment of the present invention, illustrated with four product containers;

FIGURE 9 is a top perspective view of a product multi-pack according to yet another embodiment of the present invention, illustrated with three product containers;

FIGURE 10 is a top plan view of an elongate web member for receiving the products of the product multi-pack of Figure 9;

FIGURE 11 is an enlarged top plan view of a portion of the system of Figure 2, illustrating an alignment station;

FIGURE 12 is an enlarged side elevation view of a portion of the system of Figure 2, illustrating a cutting station;

5 FIGURE 13 is a cross section view of the cutting station of Figure 12, taken along the line 13-13; and

FIGURE 14 is a diagram illustrating a pair of linkage assemblies of the cutting station of Figure 13.

DETAILED DESCRIPTION

10 Figure 1 illustrates a product multi-pack for securing and displaying product at a point of purchase, and is generally referenced as numeral 10. A product multi-pack 10 of the illustrated embodiment includes a pair of product containers 12, a web 13 and a carton 14 coupled to each other.

15 The product containers 12 are elongate containers that are sized for enclosing a consumable product. The containers 12 may be blow molded and generally cylindrical in shape. The web 13 is a thin sheet of elastic material that attaches a pair of containers 12 together. The web 13 is sized for receiving a portion of each of the containers 12, and provides a frictional resistance that opposes rotation of the container 12 relative to the web 13. The carton 14 supports and displays the
20 pair of containers 12 at the point of purchase.

 The containers 12 are circumferentially symmetrical about a vertical axis 16 (Fig. 2). Alternate embodiments envision containers having other shapes such as spherical or an "hourglass". The containers 12 include a bottom region 18 for resting upon an underlying surface. The containers 12 also include a re-closeable top
25 20. A tubular wall 22 extends between the bottom 18 and top 20 of each container 12. A label 24 is disposed over a limited section of the circumference of the wall 22. The

label 24 includes a logo for the product, such as the 5-hour Energy ® logo. The containers 12 are oriented such that the labels 24 are both facing the same direction.

5 An indicator 26 is provided on the exterior of the container 12, for indicating a rotational position of the label 24 relative to the current position of the container 12. For example the indicator 26, may be a marking on the top 20 that correlates to a lateral edge or seam of the label 24. Alternatively the indicator 26 may be a lateral marking, edge, seam or an image on the label 24 itself. Another embodiment of the indicator 26 envisions an indentation (not shown) on the bottom
10 region 18, that correlates to a label 24 position.

Referring to Figure 2, a system 28 is provided for orienting and packaging the product multi-pack 10. The system 28 includes a first conveyor belt 29 for conveying the product containers 12 through a series of stations. Each station contributes to the overall packaging and orienting of the product containers 12. The
15 conveyor 29 is configured to generally convey the containers 12 in a linear direction. Alternate embodiments of the conveyor 29 envision conveying the containers in a non linear direction, or linear with curved portions.

A controller 30 is provided for communicating with the series of stations of the system 28. The controller 30 generally includes any number of
20 microprocessors, ASICs, ICs, memory (e.g., FLASH, ROM, RAM, EPROM and/or EEPROM) and software code to co-act with one another to communicate with the stations of system 28. The controller 30 is configured for receiving signals from the series of stations, indicating various aspects of the individual stations as the containers 12 are conveyed along the system 28. The controller 30 is also configured for
25 analyzing the received signals, and transmitting signals/commands back to the stations.

The system 28 includes a feed station 32 for controlling the flow of the conveyed product containers 12. The feed station 32 receives a plurality of product containers 12, each positioned in a generally upright orientation. The feed station 32
30 is coupled to the conveyor 29, such that the feed station 32 controls the width and

longitudinal spacing of the conveyed containers 12. The feed station 32 controls the width of the conveyed containers 12 by funneling the containers 12 into a pre determined lateral spacing. For example, the feed station 32 may only permit the containers 12 to proceed in a single file line along the conveyor 29. Alternate
5 embodiments of the feed station 32 envision the station 32 grouping the product containers 12 side by side, with multiple containers 12 (e.g. two or three) laterally aligned on the conveyor 29. Additionally, the feed station controls the longitudinal spacing, such that there generally is no space between consecutive containers 12.

 The system 28 also includes a web application station 34. At the web
10 application station 34, the elongate plastic web 13 is installed over the laterally aligned series of conveyed containers 12. The web 13 attaches the containers 12 to each other. The web application station 34 includes a drive sprocket (spool) 38 for the web 13 to be wound upon. The spool 38 is positioned above the conveyor 29, such that the web 13 extends downward from the spool 38 to longitudinally align with the conveyed
15 containers 12. The web application station 34 also includes an applicator mechanism 40 having multiple small spools for installing the web 13 to each container 12.

 The web 13 is a thin elongate strip of flexible elastically deformable plastic. The web 13 is provided with a series of apertures 42 projecting through the thickness of the web 13. Each aperture 42 is sized for receiving an outer diameter of
20 the top 20 of the container 12. The web 13 elastically deforms around each aperture 42 to conform to and frictionally engage the top 20 of each container 12. The apertures 42 are generally centrally oriented about a width of the web 13, and longitudinally aligned about a length of the web 13.

 Referring to Figures 2 and 11, an alignment station 48 receives the
25 conveyed linked containers 12 from the web application station 34. The containers 12 are received by the alignment station 48 at an upstream area 120 and exit the alignment station 48 at a downstream area 122. The alignment station 48 includes a first drive member 50 and a second drive member 50'. Both drive members 50 and
30 50' upwardly extend from fixtures (not shown) positioned on opposing sides of the conveyor 29. Each drive member 50 and 50' operates a rotating belt 52 and 52'

respectively. The pair of belts 52 and 52' are transversely spaced apart and generally aligned parallel to each other. The pair of drive members 50 and 50' are configured such that their respective belts 52 and 52' frictionally engage opposing walls 22 of the conveyed containers 12. The belts 52 and 52' may be sized to simultaneously engage
5 a series of consecutively conveyed containers 12.

The controller 30 independently controls the speed of each drive member 50 and 50', to selectively rotate the containers 12 as they translate through the alignment station 48. The controller 30 may allow the containers 12 to translate through the alignment station 48, without rotating relative to the web 13, by
10 commanding the drive members 50 and 50' to drive the belts 52 and 52' at the same tangential velocity. Additionally, the controller 30 may rotate the containers 12 about their respective axis 16 and relative to the web 13, by commanding the drive members 50 and 50' to operate the belts 52 and 52' at different tangential velocities. The controller 30 is programmed with pre-determined data regarding the desired rotational
15 position of each container 12 once it exits the alignment station 48.

The alignment station 48 includes a rotation sensor 44, that is configured for measuring the rotational position of each product container 12 as it is conveyed through the station 48. The sensor 44 detects the indicator 26 on the container 12 and takes a measurement of the position of the indicator 26 relative to a
20 pre-determined coordinate system to measure the rotational position of each container 12. The sensor 44 transmits a position signal 46 "ORIENT_MSMT" to the controller 30 that is indicative of the orientation of each container 12. The pre-determined coordinate system may be a 360 degree polar coordinate system centered about the vertical axis 16 of each container 12. It is generally recognized that other
25 sensors/measuring devices may be used. The particular type of measuring device that is implemented may vary based on the desired criteria of a particular implementation.

The controller 30 receives the ORIENT_MSMT signal 46 from the sensor 44 and determines the speed required for each drive member 50 and 50' to rotate each container 12 to a desired orientation. The controller 30 may include signal
30 conditioning equipment (not shown) for adjusting and digitizing any such received

signals. The controller 30 accesses and analyzes the digitized signals. The controller 30 compares the current orientation of each container 12 to a pre-determined desired orientation. For example, with reference to Figure 11, a desired orientation of each container 12 may correspond to an indicator 26 position of two hundred and seventy
5 degrees (270°) about the vertical axis 16, as illustrated in the containers 12 that are exiting the alignment station 48 at the down stream area 122. An unoriented container 124 is measured by the position sensor 44. The sensor 44 sends a ORIENT_MSMT to the controller 30 indicating that container 30 has an initial position of five degrees (5°). The controller 30 determines that the unoriented container 124 must be rotated
10 ninety five degrees (95°) counter clockwise to be properly oriented. The controller 30 references pre-determined test data to determine that to rotate the unoriented container 124 (95°) counter clockwise, the first drive member 50 must rotate faster than the second drive member 50'. The controller 30 transmits a
DRIVE_1_CONTROL_SIGNAL to the first drive member 50 and a
15 DRIVE_2_CONTROL_SIGNAL to the second drive member 50', corresponding to the calculated values. The drive members 50 and 50' receive the control signals, and rotate the unoriented container 124 into the desired oriented position as it exits the alignment station 48. An alternate embodiment of the alignment station includes a position sensor that is positioned in proximity to the upstream area. In such an
20 embodiment, the controller may track the position of each container as it is conveyed through the alignment station.

The drive members 50 and 50' adjust their output rotational speed based on input signals from the controller 30. Each drive member 50 and 50' includes a motor and geartrain (not shown) for converting input electrical power into output
25 mechanical rotational power. The motors may be AC or DC. The control signals that are sent to the drive members 50 and 50' may be indicative of a desired speed, and the drive members adjust their output speed accordingly. Alternate embodiments of the system 28 envision that the controller provides the input voltage to the drive members via the control signal, and thereby varies the speed of the drive members motors by
30 varying the input voltage.

With reference to Figures 2, 12 and 13, a cutting station 54 receives the series of connected and oriented conveyed containers 12 from the alignment station 48, and separates them into subassemblies of linked containers 12. For example the cutting station 54 of the illustrated embodiment separates the containers 12 into subassemblies of two linked containers 12. The cutting station 54 includes a feed sensor 56 and a transverse cutting mechanism 58 operatively coupled to each other. The sensor 56 measures the longitudinal position of the containers 12 and transmits a corresponding feed signal 60 to the controller 30. The feed sensor 56 may be a laser sensor that is positioned to indicate the presence of a container 12. It is generally recognized that other sensors/measuring devices may be used. The particular type of measuring device that is implemented may vary based on the desired criteria of a particular implementation. The controller 30 analyzes the signal 60 and commands the cutting mechanism 58 to actuate and transversely cut the web 13 thereby separating the series of containers 12 into subassemblies of linked containers 12.

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The cutting mechanism 58 includes a belt drive 130 for rotating a pair of blades 132 and 132'. The belt drive 130 includes a belt motor 134, a belt gear train 136 and a pair of belts 138 and 138' that are coupled to each other. The gear train 136 includes a motor gear 140, an idler gear 142 and a pair of belt gears 144 and 144'. The motor gear 140 is fixed to an output shaft of the motor 134. The idler gear 142 meshes with the motor gear 140. One belt gear 144' is driven by the motor gear 140 and another belt gear 144 is driven by the idler gear 142, such that the belt gears 144 and 144' rotate in opposite directions. Each belt gear 144 and 144' is fixed to a belt axle 146 and 146', such that the axles 146 and 146' rotate with the gears 144 and 144'. Each belt 138 and 138' is driven by one of the belt axles 146 and 146'. Each belt 138 and 138' is also connected to a blade shaft 148 and 148', for rotating a corresponding blade 132 and 132'. Since the belt gears 144 and 144' rotate in opposite directions relative to each other, the corresponding belts 138 and 138' and blades 132 and 132' also rotate in opposite directions.

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The cutting mechanism 58 includes a blade drive 150 for actuating the rotating pair of blades 132 and 132' through an arcuate path to transversely cut the web 13. The blade drive 150 includes a servo motor 152, a slider crank 154 and a pair of

symmetric linkage assemblies 156 and 156' that are coupled to each other. The servo motor 152 is configured for rotating a servo output shaft 158 at approximately one hundred and eighty degree (180°) increments. The slider crank 154 includes a crank 160 coupled to a connecting rod 164. A crank 160 is fixed to a distal end of the output shaft 158. The crank 160 includes a post 162 that is axially adjacent to the output shaft 158, such that the post 162 revolves around the shaft 158. The connecting rod 164 receives the post 162 of the crank 160. An opposite end of the connecting rod 164 is coupled to a transverse axle 166. The transverse axle 166 is constrained within a linear guide bearing 168. Thus the slider crank 154 converts rotation (crank) of the servo output shaft 158 into translation (slide) of the transverse axle 166. The pair of symmetric linkage assemblies 156 and 156' are coupled to the slider crank 154 at the transverse axle 166. A pair of driven links 170 and 170' couple the transverse axle 166 to the blade shafts 148 and 148'. A pair of idler links 172 and 172' couple the blade shafts 148 and 148' to the belt axles 146 and 146'. Thus the servo motor 152 drives the slider crank 154 which translates the transverse axle 166 up and down. As the transverse axle 166 translates upward, the driven links 170 and 170' pivot upward and the idler links 172 and 172' pivot inward, thereby actuating the blades 132 and 132' to transversely cut the web 13. Then as the transverse axle 166 translates downward, the driven links 170 and 170' pivot downward and the idler links 172 and 172' pivot outward, thereby actuating the blades 132 and 132' away from the web 13.

Figure 14 illustrates the arcuate motion of the blades 132 and 132' as provided by the linkage assemblies 156 and 156'. The solid lines represent the position of the driven links 170 and 170' and the idler links 172 and 172' in a cutting position. The dashed lines represent the position of the driven links 170 and 170' and the idler links 172 and 172' in an open position, where the blades 132 and 132' are actuated away from the containers 12.

The arcuate path of the blades 132 and 132' may be altered by adjusting the position of the servo motor 152. The servo motor 152 is adjustably mounted to a fixture of the cutting station 54, such that the height of the servo 152 relative to the conveyor 29 may be adjusted. By adjusting the height of the servo 152 the cutting position and the open position may be altered. For example, as the height of the servo

152 increases, the blades 132 and 132' are closer to each other at both the cutting position and the open position. Such an adjustment may be needed to accommodate webs 13 of varying transverse widths.

5 The system 28 includes a carton conveyor line 62 that is positioned adjacent to the first conveyor 29. The carton conveyor 62 receives a plurality of carton blanks 64. The conveyor 62 passes the blanks 64 through a series of carton erecting stations 66 to erect the carton 14. The carton 14 is positioned for receiving a subassembly of linked containers 12.

10 The first conveyor 29 includes a transfer station 68 for individually transferring subassemblies of linked containers 12 to the carton conveyor line 62. The transfer station 68 includes a transverse dial 70 for receiving linked containers 12. The dial 70 is transversely aligned relative to the longitudinal length of the first conveyor 29. The dial 70 rotates about an axis (not shown) that is positioned below
15 an upper planar surface of the conveyor 29, such that a portion of the circumferential edge of the dial 70 extends above the conveyor 29. A series of pockets 72 are formed within the portion of the circumferential edge of the dial 70. The pockets 72 are sized for receiving the linked containers 12. At a first dial position, the pocket 72 receives the linked containers 12. The controller commands the dial 70 to rotate from the first
20 dial position to a second dial position. An ejection system (not shown) is coupled to the dial 70, for ejecting the linked containers 12 at the second dial position. The linked containers 12 are ejected from the second dial position, and received by the carton 14 of the carton conveyor line 62.

25 An opened carton 14 is positioned on the carton conveyor line 62 to receive the linked containers 12 and proceeds to complete the packaging process. After receiving the containers 12 within the open carton 14, the conveyor line 62 closes the carton 14 to form a multi-pack 10. The carton conveyor line 62 may include additional stations for packaging an assortment of multi-packs 12 within a box 76, and palletizing a plurality of boxes on a pallet 78.

Alternate embodiments of the system 28, envision the addition of a leak test station (not shown) for detecting defective containers. Such a leak test station may be coupled to the conveyor 29, upstream of the feed station 32. A leak test station would squeeze containers 12 for detecting fractures or improper product
5 volumes within the containers 12.

Regarding Figures 3-4, the container 12 is provided with the re-closeable top 18, so that a user may open the top 18, consume some of the product inside, then re-close the top 18. The container 12 includes an opening 80 and a cap
10 82 that are operatively coupled to each other. For example the opening 80 may be an externally threaded neck, and the cap 82 may include internal threads (not shown).

The container 12 is sized for enclosing a nominal volume of fluid, such as 2 fluid ounces. Alternate embodiments envision containers for enclosing solid products such as medicine or vitamins. Additional alternate embodiments envision
15 containers for larger volumes of fluid, such as 4 or 6 ounces.

A shrink wrap plastic covering 84 is disposed over a substantial portion of the outer circumference of the container 12 and acts as a seal. The covering 84 axially extends along the wall 22 of the container 12 to partially cover the cap 82. The covering 84 includes a pair of perforated regions that act as a seal for the container 12,
20 by both preventing the cap 82 from inadvertently unscrewing and also for visually indicating to a user that the cap 82 had previously been unscrewed or "tampered with". A perforated ring 85 extends along the circumference of container 12 at the base of the cap 82. A tear strip 86 extends from the ring 85 to an edge of the covering 84 on the top of the cap 82. To open a container 12, a user may remove the tear strip 86,
25 then unscrew the cap 82, which breaks the perforated ring 85. The covering 84 may include the label 24 formed within, or the covering 84 may be generally transparent and formed over the label 24. Alternate embodiments of the container 12, envision a seal, comprised by a 2-piece cap assembly (not shown), whereby a lower ring is detached from the cap during the first time the seal is broken. Such a seal is
30 commonly used in the soft drink industry.

With respect to Figure 5, the web 13 is made of a thin elastic polymer that is sized for receiving the containers 12. The web 13 may be formed of an elastic polymer such as polyethylene (PE) or polypropylene (PP) or low density polyethylene (LDPE). The web 13 includes the series of apertures 42 for receiving the caps 82 (Figs. 3-4) of the containers 12. The outer diameter of the cap 82 is generally larger than the inner diameter of the aperture 42, thereby providing an interference fit. The web 13 elastically deforms to receive the cap 82 of the container 12. The cap/web interface provides a frictional resistance that opposes the rotation and translation (pull-out) of the container 12 relative to the web 13. The frictional resistance helps maintain the oriented position of the containers 12. For example, an interference fit may be provided by a web 13 having apertures 42 with inner diameters of 0.812 inches, that are sized to receive containers 12 having caps 82 with outer diameters of 0.895 inches.

The web 13 includes a series of pairs of perforations (perf-pairs) 88 for maintaining tension within the web 13 during application of the web 13 to the containers 12. The perf-pairs 88 are transversely spaced apart pairs of slots that are longitudinally spaced along the length of the web 13. The perf-pairs 88 are sized for receiving pins (not shown) that radially extend from the circumference of the spool 38 (Fig. 2), and also radially extend from the circumference of the small spools of the applicator 40 (Fig. 2).

The web 13 also includes a series of transverse slits 90 that assist the cutting station 54 (Fig. 2) in separating the series of containers 12 into subassemblies of linked containers 12. The slits 90 extend partially across the width of the web 13. However the slits 90 terminate short of the opposed transverse edges of the web 13. The width of the web 13 is approximately equal to the maximum diameter of the container 12. At the cutting station 54, the controller 30 commands the transverse cutting mechanism 58 to cut the web 13 at each slit 90, thereby separating the series of containers 12 into linked containers 12. In the illustrated embodiment, there are at least two apertures 42 and three pairs of perforations 88 between adjacent slits 90, therefore the cutting station 54 separates the series of containers 12 into subassemblies of two linked containers 12. The length of a portion of the web 13, after it is cut by

the cutting station 54, is approximately equal to the maximum diameter of the container 12 multiplied by the number of containers 12 that are linked in the subassembly.

5 Regarding Figures 6-7, a carton 14 is provided for supporting and displaying product containers 12 that are retained therein. A die-cut carton blank 64 may be formed from a sheet of cardboard. The blank 64 includes a window 92, a pair of hanger apertures 94, a glue tab 96 and a plurality of fold seams 98 formed therein. The blank 64 is erected into a carton 14 by the erecting stations 66 of the carton
10 conveyor 62 (Fig. 2). The erecting stations 66 include equipment (not shown) to fold the blank 64 at the seams 98 and apply adhesive to the glue tab 96 to erect the carton 14. Once erected, the window 92 provides an internal view of the contents retained within the carton 14. For example, the containers 12 within the multi-pack 10, are externally displayed through the window 92. The pair of hanger apertures 94 are
15 aligned during the erecting of the carton 14 to provide a location for receiving a post or hanger (not shown) for organizing the multi-packs 10 at the point of purchase. The blank 64 includes an assortment of additional sections that form the support structure of the carton including: a top, bottom, back and side walls.

20 With reference to Figures 8-10, alternate embodiments of the product multi-pack 10 envision multi-packs of different quantities of containers 12. These alternate embodiments may include multiples of the two-pack configuration (e.g., four-packs, six-packs). Alternatively, embodiments contemplate a three-pack, or multiples thereof (e.g., six-packs, nine-packs). Still further embodiments envision
25 combinations of two-packs with three-packs (e.g., five-packs and seven-packs).

Figure 8 illustrates a Four-Pack 100 for supporting and displaying four containers 12. The Four-Pack 100 includes a dual window carton 102, having a pair of windows that open on opposite sides of the carton 102. Two pairs of containers 12 are retained within the Four-Pack 100. Each pair of containers 12 is connected by a
30 web 13 (not shown). Each container 12 is oriented relative to its connected container 12, such that the labels 24 face in the same direction, outward of the carton 102.

Figures 9-10 illustrate a Three-Pack 104 for supporting and displaying three containers 12. The Three-Pack 104 includes a large window carton 106, having a large widow that extends along a side of the carton 106. Three containers 12 are retained within the Three-Pack 104. The containers 12 are connected by a three-web 108. The three-web 108 includes a series of apertures 110 for receiving the caps 82 (not shown) of the containers 12. The three-web 108 also includes a series of perf-pairs 112 for maintaining tension within the three-web 108 during application to the containers 12. The three-web 108 also includes a series of transverse slits 114 that assist the cutting station 54 (Fig. 2) in separating the series of containers 12 into linked sub-assemblies. In this embodiment, there are three apertures 110 and four pairs of perforations 112 between adjacent slits 114, therefore the cutting station 54 separates the series of containers 12 into subassemblies of three linked containers 12. Each container 12 is oriented relative to its connected containers 12, such that the labels 24 of the containers face the same direction outward of the carton 104.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. Additionally, the features of various implementing embodiments may be combined to form further embodiments of the invention

WHAT IS CLAIMED IS:

- 1 1. A product multi-pack comprising:
2 a plurality of elongate generally circumferentially symmetrically shaped
3 product containers, each having a bottom region, an open top closed by a cap and a
4 tubular wall extending there between, with the wall provided with a label having a
5 front portion extending about a limited section of the wall circumference;
6 a carton sized to display the plurality of product containers retained
7 therein, the carton having an open face exposing a portion of the product container
8 wall; and
9 a locator web formed of a thin sheet of plastic having a plurality of
10 spaced apart apertures formed therein and sized to be at least partially elastically
11 deformed when installed over the caps of the product containers;
12 wherein the locator web provides frictional resistance to rotation of the
13 product containers enabling the containers to be positioned and held in place relative
14 to the carton open face so that the label front portions are visible.
- 1 2. The product multi-pack of claim 1 wherein the carton is sized
2 to contain at least two product containers.
- 1 3. The product multi-pack of claim 1 wherein the cap of the
2 product containers has an outer diameter that is larger than a corresponding inner
3 diameter of the aperture, such that an interference fit is formed when the cap is
4 inserted into the aperture of the web, the interference fit providing the frictional
5 resistance to rotation of the container.
- 1 4. The product multi-pack of claim 1 wherein the web has a width
2 approximately equal to the maximum diameter of the product containers and a length
3 approximately equal to the width multiplied by the number of product containers
4 interconnected by the web.

1 5. A method of packaging at least two generally circumferentially
2 symmetrically shaped product containers provided with a label having a front portion
3 extending about a limited section of the circumference in an open face carton,
4 comprising:
5 inserting an end of each of at least two product containers into one of
6 a plurality of spaced apart apertures in a plastic web;
7 optically sensing the orientation of the product containers;
8 automatically rotating the product containers to a desired position
9 based on the sensed orientation and the location of the label front portion; and
10 enclosing the at least two product containers and the interconnecting
11 plastic web into an open face multi-pack carton so that the label front portions of the
12 plurality of product containers are oriented to be visible through the carton open face.

1 6. The method of claim 5, wherein each aperture elastically
2 deforms when the end of the product container is inserted, thereby the aperture
3 conforms to and frictionally engages the end of the product container.

1 7. The method of claim 5, wherein a pair of drive members
2 frictionally engage the product containers to automatically rotate the product
3 containers relative to the web so that the label position of the product container when
4 released from the drive members is in a desired position based on the sensed
5 orientation and the location of the label front portion.

1 8. The method of claim 5, further comprising cutting the web at
2 spaced apart positions between adjacent apertures forming a plurality of product
3 containers interconnected by a web segment with the labels oriented in a desired
4 position.

1 9. A system of filling a multi-pack carton with plurality of
2 elongate generally circumferentially symmetrically shaped product containers, each
3 having a bottom region, an open top closed by a cap and a tubular wall extending there
4 between, with the wall provided with a label having a front portion extending about
5 a limited section of the wall circumference, the system comprising:

6 a conveyor for conveying product containers through a series of
7 stations;
8 a controller for receiving signals from the stations, the controller
9 analyzes the received signals and transmits control signals to the stations in response
10 to the received signals;
11 a feed station coupled to the conveyer for organizing product containers
12 to be conveyed;
13 a web application station for installing thin elongate web to the
14 conveyed product containers;
15 a rotation sensor for measuring a product container indicator position
16 that is indicative of a label orientation and transmitting a corresponding orientation
17 signal to the controller;
18 a product container alignment station for receiving speed control
19 signals from the controller and operating a pair of drive members in response to the
20 received speed control signals for rotating a series of connected conveyed product
21 containers;
22 a feed sensor for measuring a longitudinal position of the container and
23 transmitting a corresponding feed signal to the controller;
24 a web cutting station for receiving cut command signals from the
25 controller and operating a cutting mechanism in response to the received cut command
26 signals for separating the series of connected conveyed product containers into
27 subassemblies of linked product containers;
28 a carton feed station for receiving a plurality of carton blanks and
29 erecting a carton from each blank;
30 a transfer station for receiving subassemblies of linked product
31 containers and transferring linked product containers into each carton; and
32 a carton closing station for closing the carton once filled.

1 10. The system of claim 9 wherein the product container alignment
2 station further comprises a pair of rotating belts that are each operated by one of the
3 drive members, the belts are generally aligned parallel to each other for
4 simultaneously engaging opposing walls of the conveyed containers.

1 11. The system of claim 10 wherein the controller compares the
2 orientation signal to a pre determined container orientation to determine the speed
3 required from each of the drive members for rotating the container to the pre
4 determined container orientation.

1 12. The system of claim 9 wherein the cutting mechanism further
2 comprises a belt drive for rotating a pair of opposing blades.

1 13. The system of claim 12 wherein each of the opposing blades are
2 generally disc shaped and positioned coplanar relative to each other.

1 14. The system of claim 12 wherein the belt drive further comprises
2 a motor and a geartrain for simultaneously rotating the pair of opposing blades in
3 opposite directions.

1 15. The system of claim 9 wherein the cutting mechanism further
2 comprises a blade drive for actuating a pair of opposing blades through an arcuate path
3 to transversely cut the connected product containers.

1 16. The system of claim 15 wherein the blade drive further
2 comprises a slider crank for converting the controlled rotation of a servo motor into
3 the translation of a transverse axle for actuating the blades.

1 17. The system of claim 16 wherein the servo motor rotates in
2 increments of at least one hundred and eighty degrees.

1 18. The system of claim 16 wherein the blade drive further
2 comprises a pair of symmetric linkage assemblies that are coupled to the transverse
3 axle for controlling the actuation of the opposing blades through the arcuate path.

1 19. The system of claim 18 wherein the pair of symmetric linkage
2 assemblies each include a driven link that couples the transverse axle to the blade and
3 an idler link that couples the blade to a fixed pivot, such that as the transverse axle

4 translates upward, the driven links pivot upward and the idler links pivot inward,
5 thereby actuating the blades to transversely cut the connected product containers, and
6 as the transverse axle translates downward, the driven links pivot downward and the
7 idler links pivot outward, thereby moving the blades away from the connected product
8 containers.

1 20. The system of claim 19 wherein a height of the servo motor
2 relative to the conveyor may be adjusted for setting a start location and a stop location
3 of each blade along its arcuate path.