Nov. 20, 1962 F. A. CHIDSEY, JR., ET AL 3,064,404

BOTTLE PACKAGING MACHINE

Filed Aug. 9, 1960 8 Sheets-Sheet 1

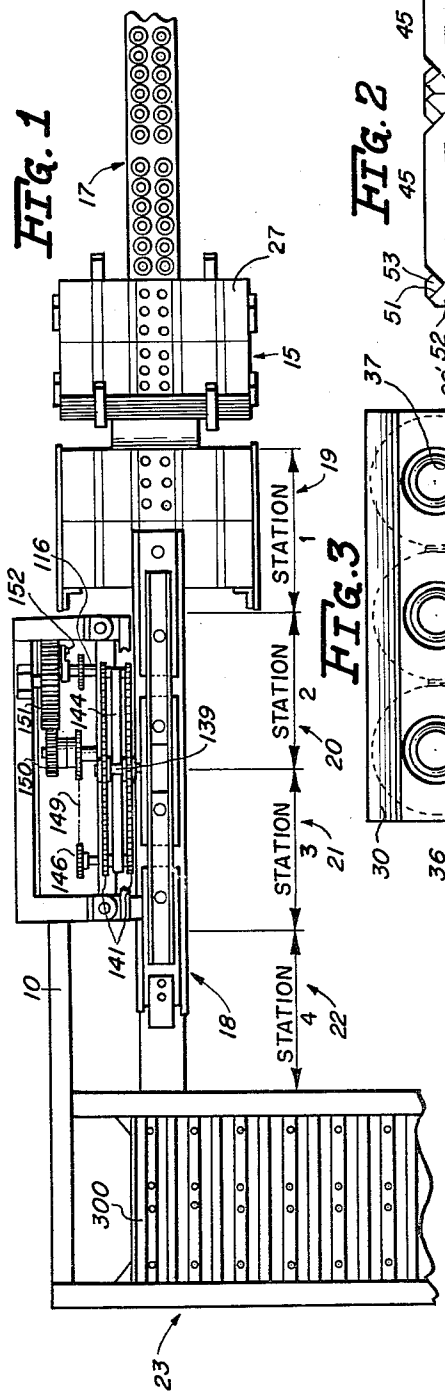


FIG. 1

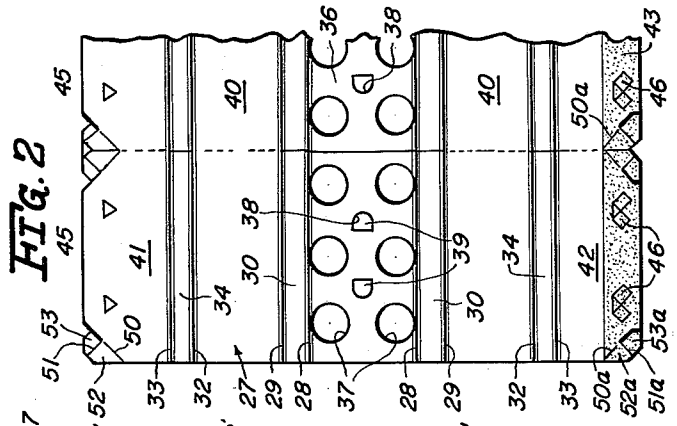


FIG. 2

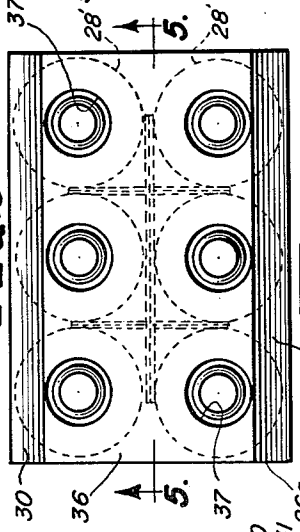


FIG. 3

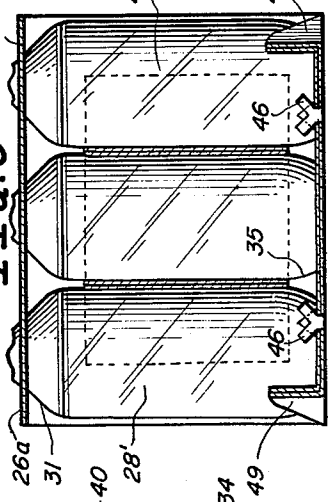


FIG. 5

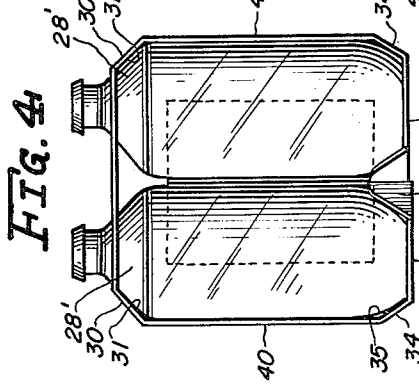


FIG. 4

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BOTTLE PACKAGING MACHINE

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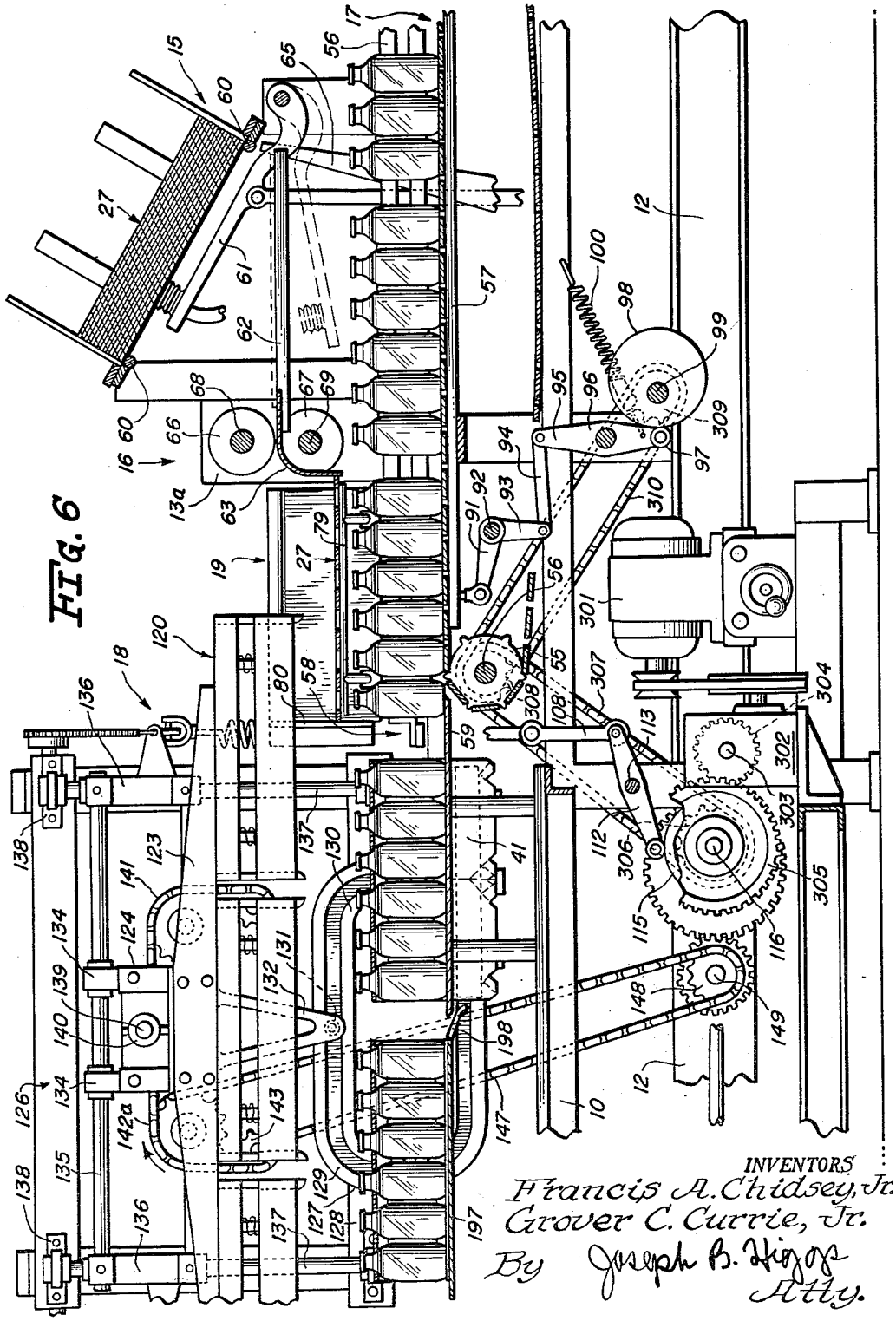


FIG. 6

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BOTTLE PACKAGING MACHINE

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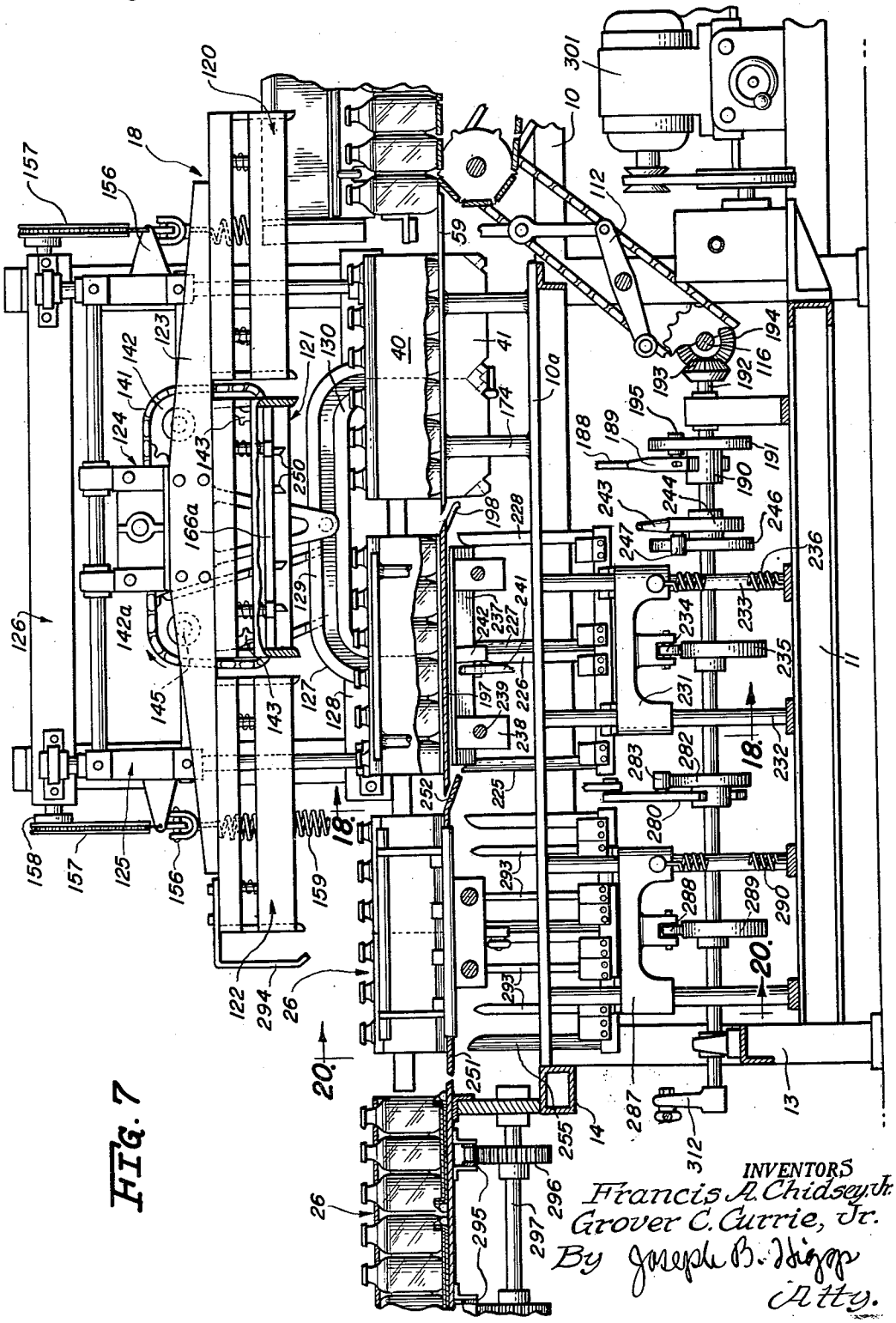


FIG. 7

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BOTTLE PACKAGING MACHINE

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FIG. 9

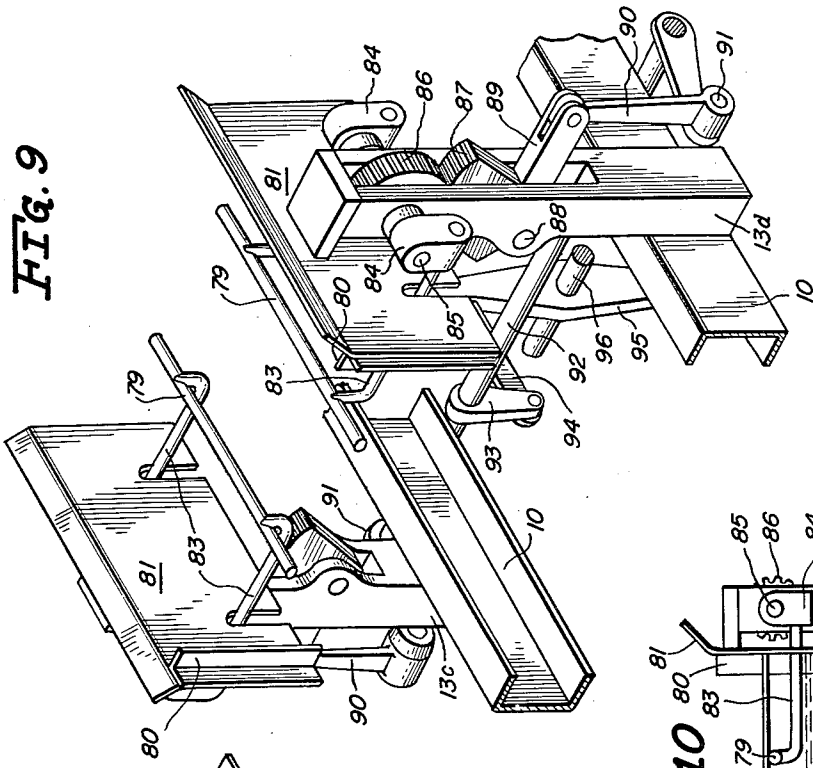


FIG. 8

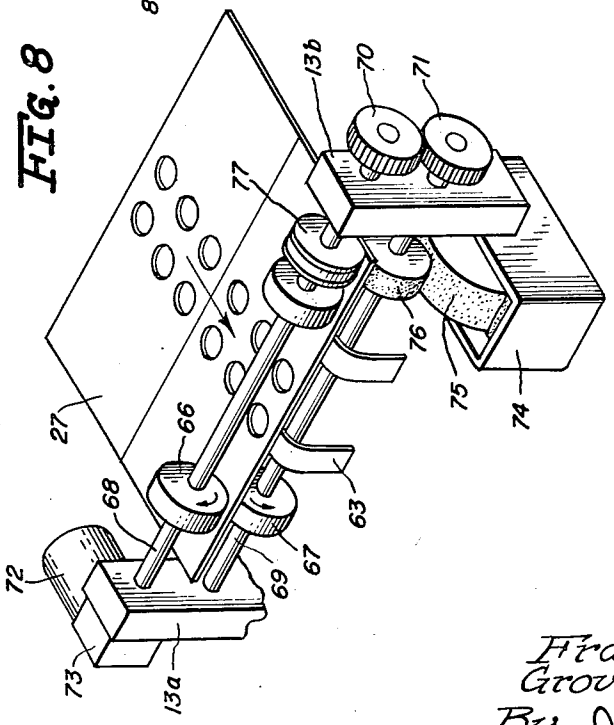
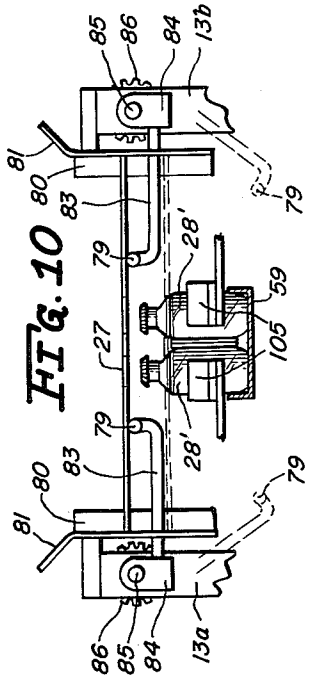


FIG. 10



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BOTTLE PACKAGING MACHINE

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FIG. 12

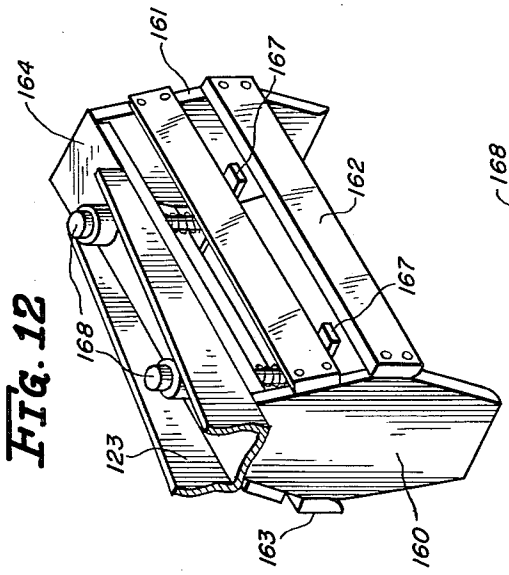


FIG. 13

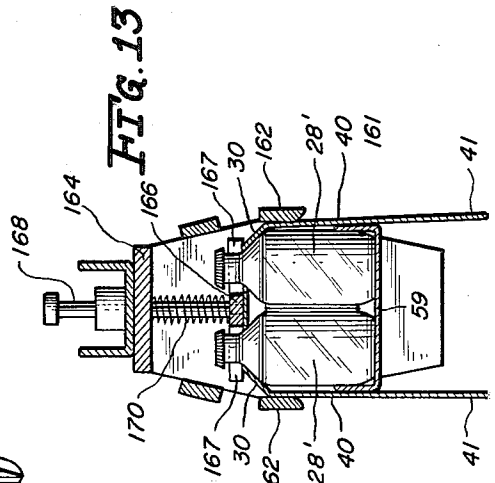


FIG. 14

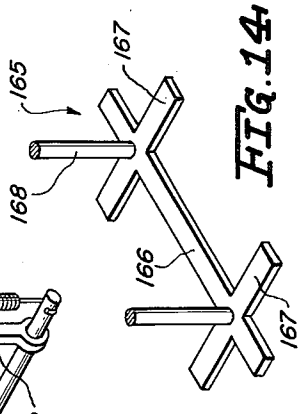
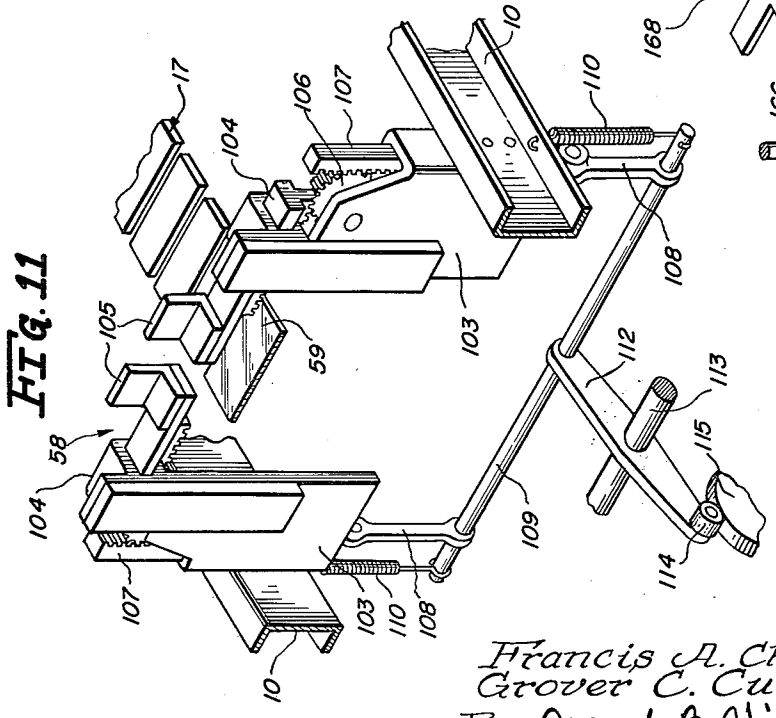


FIG. 11



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BOTTLE PACKAGING MACHINE

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FIG. 16

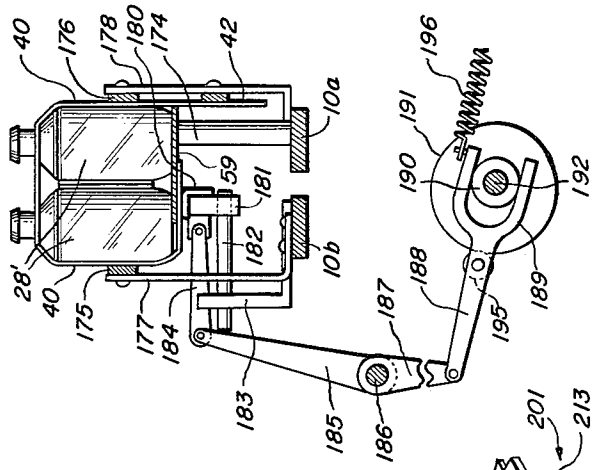


FIG. 15

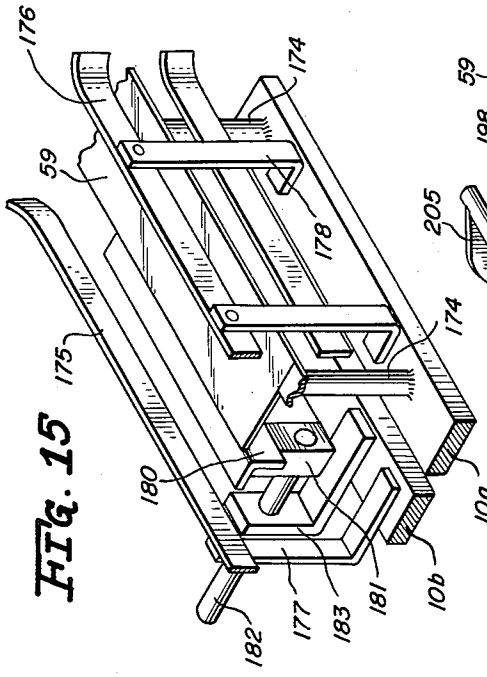
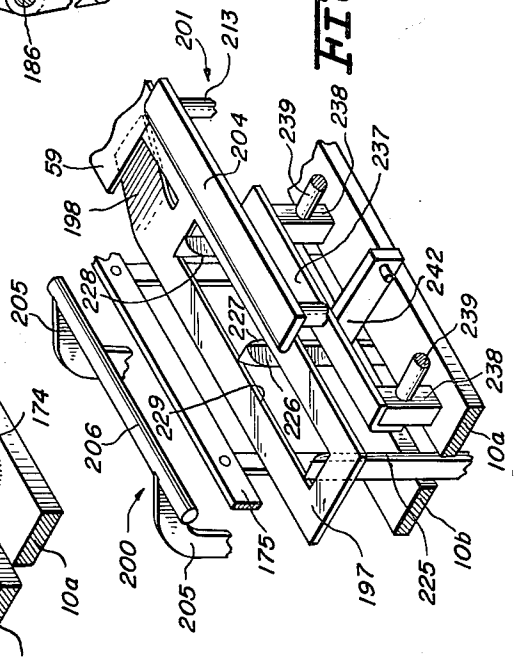


FIG. 17



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BOTTLE PACKAGING MACHINE

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FIG. 18

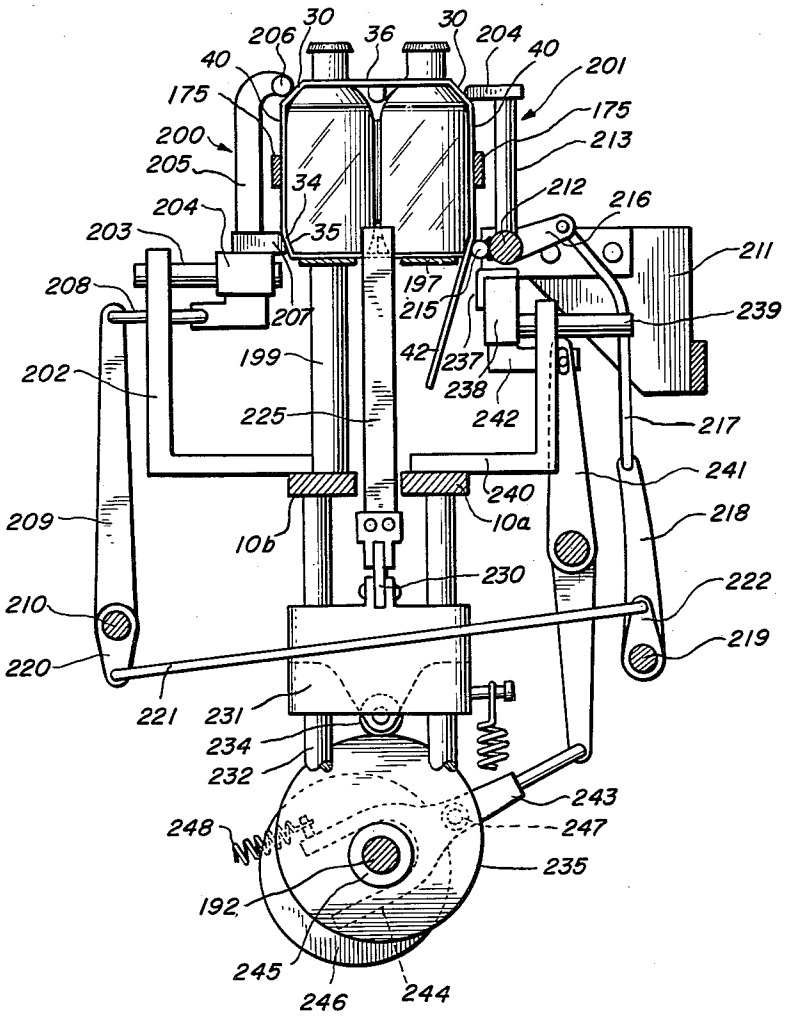
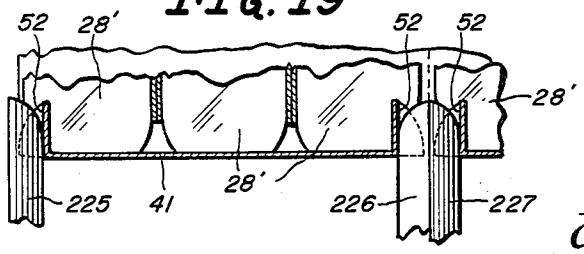


FIG. 19



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Nov. 20, 1962 F. A. CHIDSEY, JR., ET AL 3,064,404

BOTTLE PACKAGING MACHINE

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FIG. 20

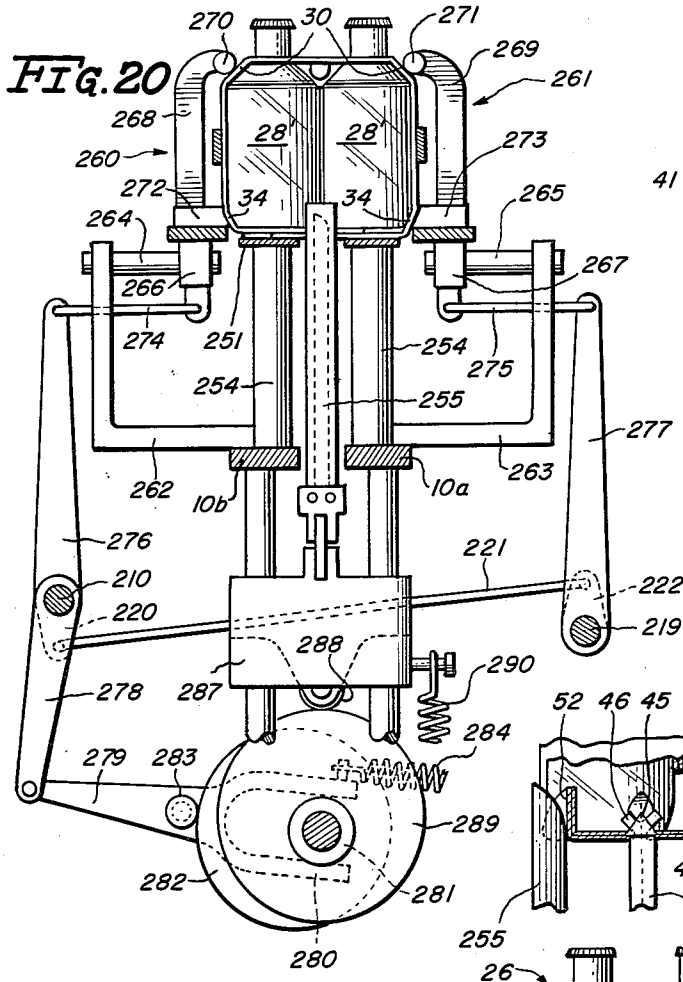


FIG. 22

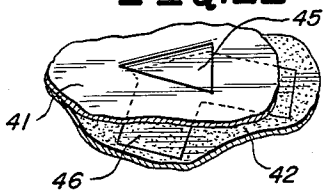


FIG. 23

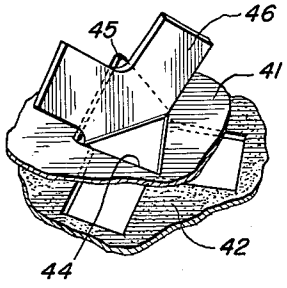


FIG. 21

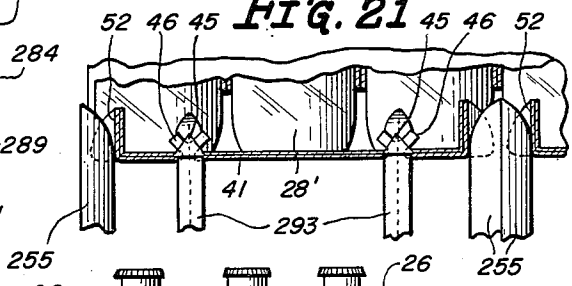


FIG. 24

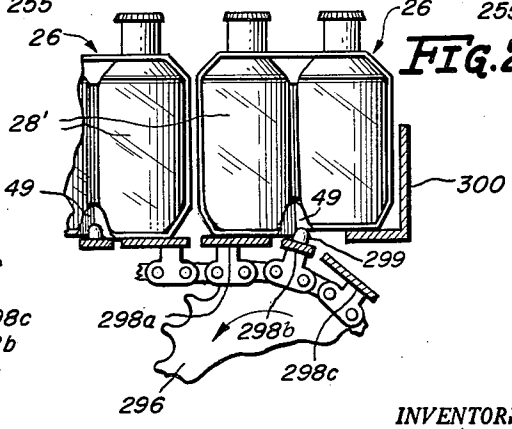
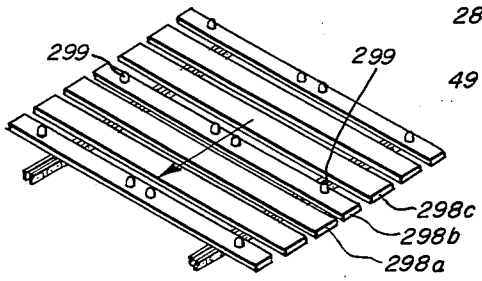


FIG. 25



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United States Patent Office

3,064,404

Patented Nov. 20, 1962

3,064,404

BOTTLE PACKAGING MACHINE

Francis A. Chidsey, Jr., Wayne, Pa., and Grover C. Currie, Jr., Charlotte, N.C., assignors to Container Corporation of America, Chicago, Ill., a corporation of Delaware

Filed Aug. 9, 1960, Ser. No. 48,496
16 Claims. (Cl. 53—48)

The present invention relates to packaging machines and more particularly to machines for enclosing bottles and similar articles within open end cartons or wrappers.

An important object of the invention is to provide a relatively simple, compact machine, particularly adapted for wrapping bottles within a carbon blank having a panel formed with openings through which the necks of bottles may project, and having additional panels which snugly enclose the sides and bottom ends of a group of bottles.

An additional object of the invention is to provide a machine for enclosing two rows of bottles or similar cylindrical articles within an open end carton or wrapper having bottom panel portions arranged to be connected, and having central retaining members at the carton open ends which serve to prevent outward displacement of the bottles at the ends of the rows.

A further object is to provide a machine of the type described which is adapted to apply a wrapper type carton blank around a group of bottles with a high degree of snugness so that the enclosed bottles will be tightly held within the wrapper.

A further object of the invention is to provide a machine having simple and effective means for causing snug engagement of the wrapper against the sloping necks of bottles held within such wrapper.

A still further object is to provide a bottle wrapping machine designed to enclose a group of two rows of bottles in an elongated wrapper which may be divided readily into two separate and complete packages, an example being the initial packaging of a group of twelve bottles, arranged in two rows of six bottles each, within a single wrapper, such package being divisible midway of its length to form two packages each containing two rows of three bottles.

A still further object of the invention is to provide means for applying adhesive to one of two overlapping bottom panels in a wrapper type carton, of the type above referred to, such bottom panels including upwardly foldable, bottle-retaining members at the carton open ends, at least one of which receives a coating of adhesive, and combining with such machine a conveyor section having means for holding the retaining members in upstanding position while the adhesive sets.

Additional and more specific objects and advantages of the present invention will become apparent as the description proceeds.

In the drawings illustrating a preferred embodiment of the invention—

FIG. 1 is a small scale plan view illustrating the entire machine;

FIG. 2 is a plan view, with a part broken away, of a preferred form of bottle wrapper blank for use on the machine;

FIG. 3 is a plan view of a package containing two rows of three bottles, being one-half of the unit which the machine of the present invention is designed to produce;

FIG. 4 is an end view of the package illustrated in FIG. 3;

FIG. 5 is a sectional view of the package, taken along line 5—5 of FIG. 3, looking in the direction of the arrows;

FIG. 6 is a partial, side elevational view, of the machine with certain parts shown in section, illustrating the bottle group receiving end, including the wrapper blank

delivery mechanism and the forming member for folding the sides of the blank against the bottle group and for advancing the partly formed packages past the wrapper treating stations;

FIG. 7 is a partial, side elevational view, being a continuation of FIG. 6, with certain parts broken away or omitted and illustrating the final wrapper blank treating stations, and showing in section the conveyor for receiving the completed package;

FIG. 8 is a fragmentary, detail perspective view, somewhat schematic in form, showing the blank as it begins its advance to the station where it is delivered in position over a bottle group, and showing the adhesive applying mechanism to apply a strip of adhesive along the blank edge;

FIG. 9 is a fragmentary detail, perspective view showing the mechanism for supporting a blank at the first assembly station ready to be moved down with the apertures of the blank surrounding the necks of the bottles;

FIG. 10 is a fragmentary detail view taken at the leading edge of the first station and looking toward the right as viewed in FIG. 6, showing the wrapper blank supported just above the bottles;

FIG. 11 is a fragmentary detail, perspective view showing the conveyor on which the bottle group is advanced and showing the stop elements for holding the bottle group in proper position to receive the wrapper blank;

FIG. 12 is a fragmentary perspective view showing the end forming box or compartment;

FIG. 13 is a fragmentary, detail, sectional view showing the forming box as it appears when it has forced a wrapper blank down over the bottle necks and brought the sides of the wrapper along the vertical sides of the bottle group;

FIG. 14 is a detail, perspective view of the follower element adapted to press the wrapper firmly against the shoulders of the bottles;

FIG. 15 is a fragmentary detail, perspective view, showing mechanism at the second forming station for folding the end portion of one side of the wrapper beneath the bottle group;

FIG. 16 is a fragmentary, detail view, looking toward the receiving end of the machine, showing the manner in which one edge portion of the blank is folded in beneath the bottle group by mechanism illustrated in perspective in FIG. 15.

FIG. 17 is a fragmentary detail, perspective view, showing mechanism at the third forming station for folding the second end portion of the wrapper beneath the bottle group;

FIG. 18 is a fragmentary elevational view, partly in section, taken along line 18—18 of FIG. 7, looking in the direction of the arrows, showing the mechanism for applying pressure laterally against the side portions of the wrapper to cause it to fit snugly around the group of bottles;

FIG. 19 is a fragmentary detail view showing vertically movable forming elements which fold upward one set of retaining parts comprising tabs or flaps formed in the wrapper blanks and designed to prevent displacement of bottles from the open ends of the wrapper;

FIG. 20 is a sectional elevation, with parts omitted, taken along line 20—20 of FIG. 7, looking in the direction of the arrows, showing mechanism for applying lateral pressure against the wrapper and also showing one of the vertically movable forming elements for folding upward the two cooperating bottle retaining parts, as illustrated in FIGS. 4 and 5;

FIG. 21 is a fragmentary sectional view taken centrally of the package and lengthwise of the machine showing the forming elements for the end retaining members of the wrapper and showing other elements which cause en-

gagement of bottom locking parts formed in the outer edge portions of the wrapper;

FIGS. 22 and 23 are enlarged, fragmentary detail views of the bottom locking parts formed in the wrapper;

FIG. 24 is a fragmentary detail view showing an end of the off-bearing conveyor for receiving freshly glued packages and retaining the upfolded retaining members in position until the glue sets; and

FIG. 25 is a fragmentary perspective view, showing a portion of the supporting surface of the off-bearing conveyor.

The machine herein disclosed is similar in numerous respects in its construction and operation to the machine disclosed in the pending application of F. A. Chidsey, jr., and G. C. Currie, Jr., Serial No. 838,276, field September 4, 1959, now U.S. Patent No. 3,037,334.

The form of carton which the machine is particularly designed to act upon is similar to the carton disclosed in the pending application of F. A. Chidsey, Jr., Serial No. 814,888, filed May 21, 1959, now U.S. Patent No. 3,016,-182. The carton is preferably prepared as a flat, rectangular blank of foldable paperboard comprising a central or top panel having openings to receive the necks of bottles, two side panels and two bottom panels or flaps designed to be overlapped and adhesively secured to hold the walls firmly against the sides of an enclosed group of bottles arranged in two rows. In order to prevent accidental displacement of the end bottles from the open carton ends, the outer corners of the bottom flaps are formed with suitable diagonal scores and cuts to provide cooperating, upwardly foldable portions. These foldable portions, when secured together in upright position, will form central, upstanding retaining members engaging adjacent surfaces of the two end bottles at each open end of the carton. The blanks are initially made to provide two complete cartons held together along a severable line which is weakened for ease in separation. In the present instance two rows of six bottles each are first enclosed in a wrapper which, when separated, becomes two complete open-end cartons holding two rows of three bottles each.

Essentially the machine as herein disclosed includes conveying means for advancing separated groups of bottles in two parallel rows to an initial assembly station. The carton blanks are conveyed to this station and brought to rest over a bottle group with the apertured central panel in registration with the bottles so that the bottle necks will be received into the openings in the central panel and this panel will come to rest upon the sloping shoulders of the bottles. Just prior to delivery of the blank into position over the bottle group a narrow coating of adhesive is applied along an outer edge of one of the bottom flaps. This adhesive also coats the individual upwardly foldable retaining portions provided on such treated bottom flap.

A unitary forming and conveying member is supported for movement above the paths of the blanks and the bottles to be packaged. This member has three similar, longitudinally aligned compartments or boxes open at the bottom so that, when the unit is moved down, each one of the boxes will surround a partially packaged group of bottles. The frame of the forming and conveying member is guided for four-way movement, that is, forwardly to advance the bottle group being packaged, then upwardly, rearwardly and downwardly to engage succeeding groups.

The first box or compartment on what may be termed the rear or trailing portion of the forming member is arranged to engage the flat blank and fold it around the bottle group at a location which may be referred to as the first treating station. As the forming member is guided on the dolnward leg of its four way movement, and just before the lower edge portions of the trailing box of the forming member come into engagement with the blank, the supports on which the blank initially comes

to rest above the bottle group are withdrawn. This clears a path for the portions of the blank constituting the side walls and bottom panels so that the forming member will force these portions to swing down parallel with the sides of the bottle group and with the apertured top or central panel resting upon the shoulders of the bottles.

When the forming member reaches the bottom of its path of travel it moves forwardly to convey the partially formed package slidably along a relatively thin supporting plate which is somewhat narrower than the package width. The forming member is then withdrawn upwardly leaving the partially formed package at the second treating station. At this station one of the downfolded bottom flaps is folded partially inward below the supporting plate by a reciprocable flap-folding element.

The partially formed package is then engaged by the middle box of the forming member and advanced from the second to the third treating station along a thin supporting plate aligned with the supporting plate at the first station. As the leading edge of the infolded bottom flap advances it rides up on a sloping extended portion of the plate at the second station, through an opening between the ends of the plates at the first and second stations. This causes the infolded flap to move from beneath the first plate and slide along the upper surface of the second plate where the flap will be in direct supporting contact with the bottoms of one row of bottles.

As the forming member moves upward, away from the partially formed package at rest at the second station, upwardly reciprocating folding elements move against the sections of retaining members located on the bottom flap that has just been brought into position against the bottoms of one row of bottles. This pre-breaks the score lines and facilitates fitting the opposite retaining member sections in proper relation at the next treating station. While the package remains at the third station the second bottom flap is folded partially inward below the supporting plate at this station.

The package is then engaged by the leading box of the forming member on its next downward movement and advanced along a supporting plate to the fourth station. At the end of the supporting plate at the third station is an opening to receive the leading edge of the last infolded bottom flap. A sloping surface is provided at this opening which guides such leading flap edge onto the upper surface of the plate at the fourth station and against the bottoms of the adjacent row of bottles. The freshly glued edge portion of this flap is also brought into lapping relation with the edge of the opposite flap.

As the forming member moves upward away from the package at rest at the fourth station, additional, upwardly reciprocable folding elements move against the sections of retaining members located on the two bottom flaps which are now in lapping relation. The individual sections of the retaining members are thus brought into their final upstanding positions and in close interfitting relation.

In order to assure snug fitting of the carton around the bottles, pressure members are employed at the third and fourth stations. These members are provided on opposite sides of the path of travel of the packages and are designed to force the carton wall portions closely against the bottles while the bottom flaps are brought into their final position and while the sections of the retaining members are being placed in interfitted relation.

A vertical pusher plate is carried on the leading end of the frame carrying the forming members. This plate engages the trailing end of a package at the fourth station and moves it into position on a conveyor designed to hold and advance the completed packages until the adhesive has set. The pusher plate engages against the completed package at the fourth station while succeeding partially formed packages are being advanced from one station to another. The conveyor has a step-by-step motion and each package is carried on three, adjacent, nar-

row supporting plates, the center plate having small posts which are brought into holding relation with the retaining members on the carton bottom flaps after the package has been moved into proper position at the receiving end of the conveyor. The conveyor has a sufficient length to permit the adhesive on the carton to set by the time the carton reaches the discharge end.

At the discharge end of the conveyor there may be provided a vertically reciprocable blade, not shown, timed with the conveyor travel and designed to sever the connections between the two carton sections with the exception of the connections between the bottom panels, which may be done by other mechanism.

Referring more particularly to the drawings, the packaging mechanism is suitably mounted on a base frame comprising upper and lower longitudinal members 10, 10 and 11, 11 and intermediate longitudinal member 12. The frame includes vertical members 13, 13 and transverse members 14, 14. Supported on the base frame is a wrapper blank magazine and feed mechanism 15; blank gluing and advancing mechanism 16; a bottle conveyor 17; four-way movable forming and conveying member indicated as a whole at 18; structure comprising a first treating station including removable blank support means indicated as a whole at 19; additional structure comprising second, third and fourth treating stations indicated at 20, 21 and 22 respectively; and an off-bearing, glue drying conveyor indicated as a whole at 23. Partially formed and completed packages are indicated as a whole at 26, made up from wrapper blanks 27 and bottles 28, 28 contained therein. Divided package units are indicated at 26*a*.

The bottles may be of various shapes, but the bottles herein illustrated are shown with relatively short necks and rounded shoulders and rounded surfaces between the side walls and bottoms. The wrapper blanks are of generally rectangular shape and formed from resilient, foldable paperboard. The blanks as herein shown are designed to wrap twelve bottles arranged in two rows of six bottles each. The packages are intended to be readily divisible into two identical units of six bottles each.

The blanks 27 are creased or scored along parallel lines 28, 28 and 29, 29 to provide narrow panels 30, 30 which will engage the sloping sections 31 of the bottles between the necks and side walls. Additional scores 32, 32 and 33, 33 provide narrow panels 34, 34 which engage the rounded parts 35 of the bottles between their sides and bottoms. The top panel 36 of the blank has neck receiving openings 37, 37 and finger openings provided by U-shaped slits 38, 38 permitting hinged tabs 39, 39 to be swung inwardly of the package and providing finger openings for convenience in carrying the package.

The principal side panels of the wrapper indicated at 40, 40 lie between score lines 29 and 32. The bottom flaps or panels indicated at 41 and 42 are designed to be overlapped and adhesively joined. For this purpose a strip of adhesive 43 is applied along the free edge of panel 42. Interlocking elements are also preferably employed to join the bottom panels. See FIGS. 2, 5, 21, 22 and 23. Openings 44 are provided in panel 41 by forming V-shaped slits to release tab 45. In the opposite panel 42 there are provided wing shaped locking tabs 46 which may be forced through the openings 44 when the panels are overlapped, as shown in FIG. 21.

At the ends of each divisible six-bottle unit 26*a*, there are provided upstanding retaining elements, indicated as a whole in set up form at 49, 49. These are formed as foldable corner portions in the blank adapted to be interfitted and permanently secured in upright condition and disposed centrally of the open ends of the package to restrain bottles from outward displacement. The retaining portions are hinged along diagonal score lines indicated at 50 on panel 41 and 50*a* on panel 42. Score lines 51 and 51*a* at right angles to the respective scores 50 and 50*a* divide the corners into foldably connected sections 52, 53 and 52*a*, 53*a*. Sections 53 and 53*a* are separated from their respective bottom panels by slits and are therefore carried on their companion sections 52 and 52*a*. The end portions of sections 53 are preferably cut away to simplify the operation of folding these sections. As will be later described in more detail, when the wrapper has been brought to enclosing condition with bottles therein, upward pressure against the central score lines 51 and 51*a* on the overlapped corner portions will cause these portions to rise and at the same time they will be folded along such central score lines because of the presence of the bottles. As glue is applied between these portions they will remain permanently in upright condition when the glue has set.

Bottle Conveyor

The bottles are brought to the packaging machine on conveyor 17 which may be of the flat top chain type passing around a sprocket 55 fixed on driven shaft 56 journalled in the base frame. The conveyor 17 preferably operates continuously and will slip beneath the bottles when held stationary at intervals. The bottles advance on the conveyor in two rows and are suitably separated into groups of twelve by conventional means such as star wheels. Guide bars 56 are provided along the sides of conveyor 17 and a supporting plate 57 is provided along which the conveyor chain elements may slide. The conveyor 17 extends beneath the first forming station where the groups of bottles are brought to rest against a movable stop mechanism indicated as a whole at 58. In the present instance the leading bottles of the group, brought to rest at the first station, move onto a plate 59 arranged at the level of the conveyor 17. At a suitable point, not shown herein, before the bottles arrive at the first treating station, paperboard dividers are preferably placed within the sub groups of six bottles, as best viewed in FIGS. 3, 4 and 5.

Blank Delivery

The wrapper blanks are placed flat within a magazine having supporting rods 60, 60 from which blanks may be removed downwardly one at a time by a suction cup on a pivoted arm 61 and deposited on horizontal supports 62 which carry at their leading ends a pair of downwardly curved guides 63, 63. See FIGS. 3 and 6. These guides serve to position the rear or trailing edge of the blank in proper position over the bottle group at the first station.

After the blank has been deposited on the supports 62 it is moved forward by an oscillating pusher finger 65, timed by suitable mechanism with the suction cup arm 61 and other operating parts. The blank is advanced by the finger 65 in between upper and lower gripping rolls 66 and 67 carried on the respective shafts 68 and 69 mounted in upright frame elements 13*a*, 13*b* carried on the base frame. The shafts are continuously driven in opposite directions through pinions 70 and 71 by means of a motor 72 carried on frame element 13*a* and operatively connected with shaft 68 through suitable gearing in gear box 73.

As the blank is fed into position at the first station glue is applied along the edge of panel 42, as indicated in FIG. 2. For this purpose a glue pan 74 is secured on frame element 13*b*. Within the pan is a roll 75 bearing against a roll 76 secured on the shaft 69. Above roll 76 is a companion roll 77 on shaft 68 arranged to bear on the upper surface of the blank and keep the blank edge in proper contact with the glue roll.

First Treating Station

At the first station the bottles are held briefly by the stop mechanism 58 and the blank is deposited upon a pair of removable support rods 79, 79. See FIGS. 6, 9 and 10. The forward or leading edge of the blank engages the vertical guides 80, 80, located on side guide plates 81, 81

just above the bottle stops 58. Between the guides 63 and 80 the blank is caused to be positioned in exact registration with the bottle group. Just before the rear or trailing box of the forming and conveying member 18 moves down to fold the blank about the top and sides of the bottle group the bottle stops will be moved apart, clearing a path for the advance of the bottles, and the blank support rods 79, 79 will be swung downward and outward to allow the blank to drop down with its apertures around the bottle necks.

The removable support rods for holding the blank above the bottle group are each secured on a pair of arms 83, 83 swingable in vertical planes toward and away from each other as best shown in FIGS. 9 and 10. The arms 83, 83 extend through slots in the plates 81 and have their rear ends secured in blocks 84, each fixed on a rock shaft 85 carried in upright frame members 13*c* and 13*d* secured to longitudinal frame members 10, 10. For the purpose of controlling the pairs of arms 83, 83 to swing in unison, each shaft 85 has a pinion 86 thereon disposed within slots in the respective uprights 13*c* and 13*d*. Meshing with each pinion 86 is a segmental gear or rack 87 pivoted at 88 in the respective upright frame members. Each segmental gear has an outwardly projecting arm 89 connected by a link 90 to a crank arm 91. The two crank arms 91 are secured at the ends of a rock shaft 92 which has a depending crank arm 93 connected by a link 94 to a rocker arm 95 mounted on shaft 96 supported in the frame members. The lower end of arm 95 has a cam follower roller 97 riding on cam 98 carried on shaft 99. See FIG. 6. A coil spring 100, having one end secured in the frame and the other secured in the lower portion of the arm 95, serves to hold the roller 97 firmly against the cam 98.

As shown in FIG. 6 the cam is in position so that the follower 97 is bearing on its low area. As the cam rotates, rocking the lower end of the arm 95 is a clockwise direction, the blank support arms 83 with rods 79 will be caused to swing down and away from supporting relation to the blank, thus freeing the blank to move down onto the necks of the bottles with the top panel of the blanks resting on the shoulders of the bottles.

The stop mechanism, indicated as a whole at 58, will now be described. As best shown in FIG. 11, attached to opposite longitudinal frame members 10, 10 are two supporting and guide members 103, 103 located near the end of conveyor 17. In the upper portion of each member 103 is a guide way extending horizontally to receive rack bars 104, 104 movable toward and from each other in a direction at right angles to the conveyor travel. At the inner end of each rack bar is an upstanding bottle engaging stop 105 which may be formed from a short angle iron section welded to the end of the guide bar. The rack teeth of bars 104 are each in mesh with a pinion 106 rotatably supported in member 103. An additional, vertically extending rack bar 107 is held in a guide way in the member 103. At the lower end of each rack bar 107 is a pivoted link 108 which is in turn connected near an end of a transversely extending rod 109. Coil springs 110 extending between the ends of rod 109 and the frame members 10 urge the rod upward and consequently racks 107 are urged upward and racks 104 are urged to move toward each other, thus tending to keep the stop elements 105, 105 normally in bottle-group retaining position. A rock lever 112, fulcrumed on a fixed pivot bar 113, has one end engaged with the rod 109 and the other carries a cam roller 114 bearing on a rotatable cam 115 (see FIG. 6) fixed on a shaft 116, suitably journalled on the base frame. Rotation of the cam 115 opens and closes the stop elements 105, 105 once for each complete rotation. Operation of the stops is timed with the movement of the rods 79 which support the wrapper blank and with the forming and conveying member. As seen in FIG. 11, the follower roll 114 is bearing against cam 115 a short distance from the high section of the cam which causes the stops to remain in open position. As the cam rotates and the follower moves to the low section of the cam, the stops are moved to closed position to remain in such position for the desired interval to hold a bottle group at rest at the first station.

Forming and Conveying Member

The forming and conveying member, indicated as a whole at 18, is guided through a four-directional path, namely, forward, upward, rearward and downward, and functions first to fold the wrapper about the top and sides of the bottle group at the first treating station and then moves the partially formed packages step-by-step past the three treating stations. The completed packages are finally delivered to the off-bearing conveyor 23 on which they remain until the adhesive between the bottom flaps and retaining parts has set.

As best seen in FIGS. 1, 6 and 7, the forming and conveying member comprises three elongated, downward opening compartments or boxes 120, 121 and 122 secured to the under-side of a channel beam 123, one web of which is secured to a movable supporting frame 124. This frame is mounted for forward and rearward movement on another frame 125 which is mounted for vertical movement on an upstanding stationary frame 126 secured on the base frame. The movement of the forming boxes is controlled by a generally rectangular guide member 127 fixed on a cross piece 128 on the frame 126. The guide member has a pair of inner and outer ribs 129 and 130 which provide a channel within which a roller 131, secured to a depending, V-shaped part 132 on the frame 123 is guided.

The frame 124 has a pair of upwardly projecting bosses 134, 134, apertured to receive a horizontally extending rod 135 having its ends fixedly secured in frame parts 136, 136 of the vertically movable frame 125. The parts 136, 136 are suitably apertured to receive individually a pair of vertically extending rods 137, 137 having their ends fixed in bracket elements 138, 138 on the upstanding frame 126.

Means are provided for continuously moving the frame 124 through its guided path. For this purpose a rigid bar or rod 139 is secured within an apertured boss 140 on the frame 124 so that the free end of the rod projects rearward.

The rod 139 is suitably secured to links of a pair of sprocket chains 141, 141 which run respectively over two groups of sprockets, including two pairs of upper sprockets 142, 142*a* and two pairs of lower sprockets 143, 143, mounted on shafts journalled between the sprockets on a beam 144 secured to the upright parts of the frame 126. See FIG. 1. The shaft 145 which carries sprocketse 142*a* also has a driving sprocket 146 fixed thereon over which passes a sprocket chain 147 (see FIGS. 1 and 6) which extends down and passes around a sprocket 148 on a jack shaft 149. This shaft is driven at a substantially uniform speed while the forming member is moving on the downward, forward and upward legs of its closed path. On the rearward travel of the forming member it is moved at an accelerated rate of speed. For this purpose a pinion 150 fixed on jack shaft 149 meshes with a gear 151 carried on a spindle fixed in the base frame. This spindle is somewhat offset from the drive shaft 116. The gear 151 has a crank pin 152 that is received in a slot of a crank lever 153 keyed on the shaft 116. While the crank pin is in the portion of the slot of the crank lever nearest the axis of the shaft 116 the movement transmitted to the gear 151 is slower than when the crank pin it in positions more remote from the axis of the shaft. The ratios of the various gears and the position of the crank lever with respect to the position of the frame 124 is such that the most rapid motion transmitted to the shaft 149 is when the frame 124 is in its rearward movement and guided along the upper part of the guide channel.

The vertically movable frame **125** is counterbalanced to relieve strain on the driving gear. For this purpose outwardly projecting lugs **155**, **156** project from the frame parts **136**. The ends of sprocket chains **157**, **157** are respectively secured to these lugs. The chains pass over individual sprockets **158** rotatable on spindles located in the upper part of the frame **126**. The other end of each chain is secured to a coil spring **159** having its lower end suitably secured on the base frame. For a more detailed disclosure of the mechanism for operating the conveying and forming member reference is made to pending application above referred to, Serial No. 838,276.

The forming boxes **120**, **121** and **122** are substantially identical and for simplicity only the box **120** will be described in detail. The front and rear walls of the box (see FIGS. 6 and 12) indicated at **160** and **161** extend below the lower edges of the side members **162** and **163**. The top **164** of the inverted box is secured to the bottom web of channel beam **123**. Beneath the top **164** is supported a follower element **165** having a central longitudinal portion **166** arranged to bear upon the top panel of the wrapper blank between the rows of bottles, and having laterally extending portions **167**, **167** to engage the top panel of the blank inwardly of the bottles at the ends of the bottle group. The follower **165** is guided by a pair of pins or rods **168** secured at their lower ends to the follower and passing at their upper end portions through apertured bosses **169** secured on the horizontal web of the channel member **123**. Coil springs **170**, bearing at their lower ends against the follower, surround the pins **168** and have their upper ends bearing against the top wall **164** to urge the follower downward. Heads **171** on the pins limit their downward movement.

In the operation of the first forming box **120** at the first treating station let it be assumed that the wrapper blank has been delivered to its supported position on the rods **79** and the bottle group has moved into position against the stops **105**. The forming box will have completed its forward motion and will be travelling rearwardly along its closed path. At approximately the time when the forming box begins its downward travel, the cam **98** will rotate so that its high section will bear against the cam follower, moving it clockwise as viewed in FIG. 6. This will cause the linkage connections to swing segmental gear **87** and rotate pinions **86** in opposite directions, causing the arms **83**, **83** to swing down to positions where the support rods **79**, **79** will move down, as shown in FIG. 10, a sufficient distance to allow the blank to drop or move down with its apertures around the bottle necks and with the top panel resting against the shoulders of the bottles. Just following release of the blank the cam **115** (see FIGS. 6 and 11) will be rotated to engage cam follower **114** against the high section of the cam, thus moving the rocker arm **112** clockwise as viewed in these figures, causing racks **107** to move down and rack bars with their stops **105**, **105** to move apart. This clears the necessary space for the leading end **160** of the box **120** to move down in facial contact with the forward end of the bottle group. The trailing end of the box **161** will move down along the trailing end of the bottle group.

As the box **120** moves down toward the bottle group, with the stops separated and the blank released, the ends **160** and **161** slide along the front and rear of the bottle group and the follower **165** will engage the top panel of the blank (see FIG. 13) to bring this panel snugly down upon the shoulders of the bottles. Further movement will bring the sides **162**, **162** of the box against the wrapper side walls **40**, **40** to fold such side walls down along the sides of the bottles. The forming member will then have reached the limit of downward travel and will then move forward to deliver the bottle group, with folded wrapper thereon, to the second forming station where the bottle group will be left as the forming member moves upwardly away from the group.

As soon as the bottle group clears the first station the next bottle group will begin to move into position, the cams **98** and **115**, as they continue to rotate, will effect closing of the stops **105** and bringing of the blank support rods to supporting position ready to receive the next wrapper blank.

Second Treating Station

At the second treating station two functions are performed. The first is to prefold the flap **41** in below the plate **59** and the second is to bring this flap up into direct supporting contact with the bottles. This second step is performed as the package begins to be transferred from the second to the third station. The plate **59** on which the package is brought to rest at the second station has a width somewhat less than the width of the bottle group. See FIG. 16, which shows the edge of plate **59** terminating midway of the center of the row on the left, as viewed in FIG. 16. Plate **59** is supported on a pair of vertical posts **174**, **174** welded to one of a pair of parallel bars **10***a* and **10***b* secured on the base frame. Side guide bars **175** and **176**, supported respectively on vertical brackets **177**, **177** and **178**, **178**, retain the packages in proper alignment on the plate **59**. These guide bars preferably extend to points adjacent the off-bearing conveyor **26**. The guide bars are preferably flared outward, at their receiving ends as shown in FIG. 15, to engage the sides of the wrapper and keep them against the bottle group.

The means for prefolding the first bottom flap **41** comprise an elongated folding element **180** (see FIGS. 15 and 16) which is in the form of an angle bar extending longitudinally of the plate **59**. This angle bar is secured on a pair of blocks **181**, **181** having guide rods **182** secured therein, slidable in openings in brackets **183** secured on frame member **10***b*. A link **184** connected to each block **181**, has its outer end pivotally connected to rocker arm **185** secured on a rock shaft **186** supported on the base frame. A short rocker arm **187** is secured on bar **186** and has its lower end pivotally connected to a reciprocable cam-actuated member **188** having a bifurcated end **189**, slidably related to a hub **190** of rotary cam **191** secured on a longitudinally extending shaft **192**. This shaft **192** carries a bevel gear **193** at its end which meshes with a similar bevel gear **194** on driven shaft **116**. See FIGS. 7 and 16.

The member **188** has a cam follower roller **195** which bears on the edge of cam **191** and is held in firm contact with the cam by a coil spring **196** secured to member **188** at one end and to the base frame at its other end. As the high section of cam **191** moves into contact with the follower, the rock lever **185** will be forced to the right, as viewed in FIG. 16, and the folding element **180** will fold flap **41** inwardly beneath the plate **59**. The timing is such that the folder moves inward after the package is brought to rest at the second station and is moved outward before the forming and conveying member engages the package to move it away from the second station.

After the flap **41** has been folded, as above described, the next step is to bring it into flat contact with the bottoms of the bottles. For this purpose the plate **59** is preferably terminated a short distance beyond the point where the leading edge of box **120** stops in its advancing movement. A narrow portion of a plate **197** is preferably disposed in the same plane with plate **59** and an adjacent portion of plate **197**, indicated at **198**, is inclined or curved downward below the level of plate **59**. As the package is advanced from the second station by the middle forming box **121** the flap **41** rides up on this sloping portion **198** so as to slide along the plate **197** where it will come into position between the plate and the bottoms of the bottles as the package is advanced.

Third Treating Station

At the third treating station four principal functions are performed. The first is to prefold upwardly the bottle-retaining corner parts **52** and **53** on the flap **41** that were

folded upward and then brought into supporting relation with the bottles as the package was moved to the third station. The second step is to bring the upper and lower narrow panels 30, 30 and 34, 34 snugly against the respective bottle shoulder surfaces and the sloping surfaces between the bottle side walls and bottoms. The third step is to prefold the second flap 42 into position below the plate 197, and the fourth step is to bring this flap into lapping relation with flap 41 and into supporting relation to the bottles above such flap.

As shown in FIGS. 7, 17 and 18, the plate 197 extends the length of the third station and is supported in a similar manner to plate 59 upon posts 199 welded to longitudinal frame bar 10*b*. Immediately after the package is brought to the third station by the center box 121 and the box has risen free of the package, it is desirable to urge the narrow panels against the bottle shoulders and against the inwardly curved or inclined bottle surfaces between the sides and bottoms of the bottles, as best seen in FIG. 18. For this purpose two sets of clamping members are employed, one set operation on each side of the package. The clamping member 200 on the left, as viewed in FIG. 18, is preferably designed for straight, reciprocating movement while the other clamping member 201 is designed to be swung into clamping position.

For supporting the clamping member 200 an L-shaped bracket 202 is secured on frame part 10*b*. The upper end of this bracket has guide openings to receive a pair of reciprocable rods, one of which is shown in FIG. 18 at 203. The ends of rods 203 are secured in a block 204 which carries fixed on its upper surface a pair of upstanding elements 205 having their upper ends curved toward the path of the packages and carrying a clamp rod 206, which will engage the narrow upper panel of the wrapper. The block 204 carries a lower clamp element 207 with a bevelled face to engage the lower narrow panel of the wrapper. The clamping member is moved toward and from the package by a linkage system including a link 208 joined to a bracket depending from the block 204. This link is pivotally connected to a rocker arm 209 fixed on a rock shaft 210 extending longitudinally of the machine with its ends mounted in the base frame members. The rock shaft 210 is operated by cam means which also operates clamping members at the fourth treating station, and such cam means will be described in due course in the description of the fourth station.

For supporting the clamping member 201 a bracket 211, suitably carried on the base frame, pivotally supports a rock bar, the end of which is indicated at 212. A pair of rods 213 are secured on the bar 212 to extend vertically. At their upper ends the rods 213 have a clamping element 214 secured thereto, adapted to engage the adjacent, upper narrow panel of the wrapper. To engage the lower narrow wrapper panel there is secured a rod 215 close to and parallel with the rock bar 212. Projecting outwardly of the bar 212 is a lever 216 to which is pivotally connected a link rod 217, which is in turn pivotally connected to a rock lever 218 fixed on a rock shaft 219 suitably mounted on the base frame to extend longitudinally of the frame and parallel with the rock shaft 210. The means for rocking the rock shaft 219 comprises a downwardly extending lever 220 fixed to shaft 210, having a link rod 221 pivotally connected at its end. The link rod 221 is pivotally connected at its other end to a lever 222 fixed to and extending upwardly from the rock shaft 219. It is apparent that when the cam operated rock shaft 210 is moved clockwise, as viewed in FIG. 18, the clamping means 200 will move against the package. Likewise, since the link rod 221 will move toward the left, this will cause link 218 to swing in a counterclockwise direction, bringing the links 218 and 217 into substantially a straight line, as shown in FIG. 18. This causes the clamping member 201 to swing and bear against the package. Thus, the wrapper will be pressed firmly against the bottle group by each clamping member. It is to be noted that the clamp rod 215 will swing downward against narrow panel 34 with a wiping action.

While the clamping members are held against the package the bottle retaining parts 52, 53 at the opposite edges of the blank, as well as centrally of the blank, are folded upward for the purpose of prebreaking the score lines and facilitating the final folding operation of the two overlapping, companion sets of retaining parts at the fourth station. For this purpose there are provided four vertically extending folding blades or fingers 225, 226, 227 and 228, arranged to move upward through an opening 229 in the plate 197. The blades are triangular in horizontal cross section and the edges are arranged to bear against the fold line between each respective pair of folded portions 52 and 53, as illustrated in FIG. 19. It is apparent that as the foldably connected portions are raised by the blades, the portion 53, which is carried on the portion 52, will bear against an adjacent end bottle and will thus be folded symmetrically with the portion 52 while the fold line between the two portions will assume a vertical position.

The folding blades are secured at their lower ends on a bar 230 held on the upper side of a vertically movable frame 231 having openings into which are received vertical guide rods 232, 232 and 233, 233 secured between lower frame members 11 and upper frame members 10*a* and 10*b*. On centrally located lugs extending down from the underside of the frame 231 is a cam follower roller 234 arranged to bear upon a rotary cam 235 fixed on shaft 192. A coil spring 236, having one end secured to the frame 231 and the other secured to the base frame, tends to urge the frame downward to keep the follower in contact with the face of the cam 235. The action of the cam is such that the blades will be moved upward immediately after the wrapper holding clamps have moved inward against the package. The blades need not remain in raised position for more than a short interval so will move downward promptly after being raised.

While the clamping members continue to be held against the package, the flap 42 is folded beneath the plate 197 by the folding mechanism at the third station. The means for folding this flap comprises an elongated folding element 237 (see FIGS. 7 and 18) which is in the form of an angle bar extending longitudinally of the plate 197. This angle bar is secured on a pair of blocks 238, 238 having guide rods 239 secured therein, slidable in openings in brackets 240 secured on frame member 10*a*. A rock lever 241, having an elongated pin-receiving opening in its upper end, is connected to an outwardly extending bracket 242, carrying a pivot pin received in the elongated opening. The rock lever is mounted on a rock shaft supported on the frame and is pivotally connected at its lower end to the end of a cam-actuated member 243 having a bifurcated end 244, slidably related to a hub 245 of a rotary cam 246 secured on the shaft 192. The member 243 has a cam follower roller 147 which bears on the edge of cam 246 and is held in firm contact with the cam by a coil spring 248 secured to member 243 at one end to the base frame at its other end. As the high section of cam 246 moves into contact with the follower, the upper end of rock lever 241 will move to the left, as viewed in FIG. 18, and the folding element 237 will fold flap 42 inwardly beneath the plate 197. The timing is such that the folder moves inward while the clamping members are in clamping contact with the wrapper, and after the folding blades carried on frame 231 have been lowered.

The folder 237 after moving inward is promptly retracted, after which the clamping members are moved to open positions and the package is ready to be advanced to the fourth station.

Short tab-depressing fingers 250, 250 are preferably arranged on the follower 166*a* in the middle box 121 to

depress the tabs 39, 39 in the finger openings 38. See FIGS. 2 and 7.

The final step of bringing flap 42 into lapping relation with flap 41 and into supporting relation to the bottles is effected as the third box, after coming down over the package, advances it to the fourth station. For this purpose an elongated plate 251, which extends the length of the fourth station, has a downwardly inclined end portion 252, similar in function to the inclined end 198 of plate 197. This inclined end portion extends below the end of the plate 197, and the latter is terminated to provide a gap to permit the folded flap 42 to slide edgewise therethrough. See FIG. 7. Thus, as the package is advanced, flap 42 rides up the inclined end 252 and is brought between the bottles and plate 251. The glued edge portion of flap 42 will also be brought into lapping contact with the edge portion of flap 41.

Fourth Treating Station

At the fourth treating station three functions are performed. The first is to clamp the wrapper again snugly about the bottle group and next, while the wrapper is so clamped, the two sets of end retaining portions, which at this station are in overlapping position, are folded up by additional folding blades. The third operation is to force the Y-shaped locking elements on flap 42 through the openings in flap 41.

The plate 251 on which the package is brought to rest at the fourth station (see FIG. 20) is supported on vertical posts, two of which are indicated at 254, 254, having their lower ends welded on the longitudinal members 10*a* and 10*b*. The plate 251 has an elongated opening to admit the four folding blades 255, 256, 257 and 258.

Immediately after the package is brought to the fourth station by the leading box 122 and such box has risen free of the package, clamping members 260 and 261 at this station will again clamp the wrapper firmly about the bottle group, bearin gupon the upper and lower narrow panels of the wrapper as previously done at the third station. The members at this station are preferably symmetrical and are supported on reversely disposed L-shaped brackets 262 and 263 suitably secured to respective frame members 10*b* and 10*a*. The upper end of each bracket has a pair of guide openings to receive reciprocable rods 264 and 265. The ends of the pairs of rods are secured respectively in blocks 266 and 267 upon which are secured upstanding clamp elements 268 and 269, having inwardly curved upper ends and carrying clamp rods 270 and 271 which engage respectively the opposite narrow upper panels of the wrapper. The blocks 266 and 267 each carry inwardly directed pieces indicated respectively at 272 and 273 which have bevelled faces arranged to fit the downwardly and inwardly sloping lower, narrow panels at opposite sides of the package.

On the lower sides of blocks 266 and 267 are depending lugs onto each of which is pivotally secured a link, indicated at 274 and 275, connected respectively to rock levers 276 and 277 secured on rock shafts 210 and 219, referred to above in describing the third station. Fixed on shaft 210 is a depending arm 278 at the lower end of which is pivotally connected a cam-actuated member 279 having a bifurcated end 280, slidably related to a hub 281 of a rotary cam 282 secured on the shaft 192. The member 279 has a cam follower roller 283 which bears on the edge of cam 282 and is held in firm contact with the cam by a coil spring 284 secured to member 279 at one end and to the base frame at the other end. This cam mechanism operates the clamping members simultaneously at both stations three and four. As the high section of cam 282 moves against the follower, the arm 278 swings clockwise, as viewed in FIG. 20. This causes clockwise turning of rock shaft 210 and counterclockwise turning of rock shaft 219 which will bring both sets of clamping members at the third and fourth stations into their clamping positions. The timing is such that both sets of clamping members will move inward against the package promptly after the forming member moves upwardly, clear of the package.

Immediately after the clamping members move against the package the vertically movable blades for shaping the bottle retaining members will be caused to rise by means of mechanism similar to that employed at the third station. The blades are mounted on a frame 287 guided on fixed, vertical rods. The frame has a cam follower roller 288 held in a depending lugs centrally of the frame. The roller 288 bears on a rotary cam 289 fixed on shaft 192 and the frame is urged downwardly by coil spring 290. As the high section of the cam 289 moves beneath roller 288 the frame with its blades is lifted into contact with the foldably connected portions 52*a* and 53*a* on the wrapper flap 42. At this station each one of the series of foldable portions of flap 41 that form retaining members are in overlapping relation with the companion foldable portion on flap 42. As indicated in FIG. 2, a strip of adhesive is applied that coats the foldable retaining member portions 52*a* and 53*a* across the entire blank as well as parts in between the foldable portions. Thus, as the retaining members are folded into their upright positions, as shown in FIG. 5, it is to be understood that the glued surface of the portions 52*a* and 53*a* will lie against the companion portions 52 and 53. The vertically movable blades will engage these portions along their fold lines and the flat parts of the blades will bear against the portions 52*a* and 53*a*, on one side, and the portions 52 and 53 at the other side will bear against the surfaces of the adjacent end bottles of each package unit of six bottles.

Simultaneously with the operation above described a group of four finger elements 293, 293 fixed on the frame 287 move upwardly against the Y-shaped locking parts 46, 46 on flap 42 and force each of these parts through individual openings 44 in flap 41 as indicated in FIG. 23.

The timing of the cam mechanism is such that the blades and fingers on frame 287 will be withdrawn downwardly out of contact with the package and the clamping members will spread apart before the forming member begins its next advancing movement. The completed package at the fourth station is then ready to be moved to the conveyor 23. To effect this movement there is affixed to the leading face of the forming member a pusher bracket 294 which is brought into position at the trailing end of the package and ejects the package from the fourth station as the forming member advances.

The conveyor 23 is supported on suitable side frame members and comprises a pair of sprocket chains 295 passing around sprockets 296 on shaft 297. For simplicity, only the receiving end of conveyor 23 is illustrated and it is to be understood that the discharge end may be similarly constructed. The links of the conveyor chains support narrow, transversely extending plates in groups of three indicated at 298*a*, 298*b*, 298*c*. The effective dimension of the groups of plates measured lengthwise of the conveyor is preferably slightly greater than the width of a package. The inner plate 298*b* may be made somewhat narrower than the plates on each side and these plates 298*b* carry short, upstanding posts 299, 299 of a size and shape to fit snugly within the angles of the bottle retaining members. See FIGS. 24 and 25.

The conveyor 23 is driven step-by-step to advance a distance slightly more than a package width. The conveyor is timed with the forming member and after each forward movement, the conveyor will stop so that the intermediate plates 298*b* are at an inclination and the upper ends of the upstanding posts 299 will not extend above the general level of the plates. An L-shaped supporting member 300 is supported on the conveyor frame at the receiving end of the conveyor. As each package is moved from the fourth station by the pusher bracket 294, it will slide on the narrow conveyor plate 298*a* and on the horizontal part of the L-shaped member 300. As

the conveyor then advances one step, the posts on plate **298***b* will move up into position in the angles of the bottle retaining members and will hold these members upright. The retaining members will be held thus until the adhesive has set. The plates of the conveyor **23** may be slidably supported on rails between the sprockets to guide the plates evenly in a single plane. At the discharge end of conveyor **23** the packages may be removed mechanically or by hand, as desired.

The drive for the bottle conveyor, forming member and cam shaft **192** is taken from a motor **301** connected through suitable transmission to gearing within gear box **302**, from which is driven a shaft **303** on which is fixed a pinion **304** meshing with a spur gear **305** on shaft **116**. See FIGS. 6 and 7. A sprocket **306** fixed on shaft **116** drives a sprocket chain **307** passing around sprocket **308** on shaft **56** which carries sprocket **55** to drive the bottle conveyor. The cam shaft **99** is driven by a sprocket **309** thereon around which passes a chain **310** and which in turn passes around a sprocket fixed on shaft **56**. The vacuum cup arm **61** and pusher finger **65** may be operatively connected to cams secured to shaft **99**, or may be operated in any other desired manner, the details of which are not vital to the mechanism of the present invention.

The conveyor **23** is suitably driven step-by-step by means of a crank **312** secured on shaft **192**. This step-by-step driving means may be substantially identical to the drive illustrated for the off-bearing conveyor in the pending application, Serial No. 838,276, above referred to, or it may be driven step-by-step by other conventional mechanism.

All of the cams in practice are adjustable to obtain the exact synchronism required in the operation of the various parts. The approximate positioning and shape of the various cams have been illustrated but it is to be understood that these details have not necessarily been shown with exactitude.

To summarize the operation—for each full movement of the forming member **18** through its closed path a segregated group of bottles will be advanced against the stop mechanism **58** and a freshly glued blank will be deposited on the blank support rods **79** at the first treating station. At a point in the travel of the forming member sufficiently ahead of its arrival on the downward leg of its movement, the support rods will be withdrawn from beneath the blank and the blank is free to move down with its apertures around the necks of the bottles. The first forming box **120** then comes into contact with the blank, causing it to be folded along the sides of the bottle group. Prior to the box **120** reaching its lowermost position the bottle stop elements are moved apart to clear a path for the front wall of the box. While the stops are still separated the forming member will move forward. This brings the forming box **120** to the second treating station. When the box **120** has moved forward the blank support rods and the stops will return to their previous positions. After the box **120** moves away from the package at the second station, and while the package is at rest, the flap **41** will be folded under plate **59** by the folder **180**.

The package is then ready to be advanced, which is done by the second or middle box **121**. As the package moves forward the flap **41** rides up the inclined part **198** of plate **197** and the flap is thus brought between the bottles and such plate.

At the third station the foldable bottle retaining portions **52** and **53** on flap **41** are folded up to pre-break their score lines, side clamps are applied to the narrow panels of the wrapper to cause these panels to engage closely the sloping shoulders and inwardly sloping lower ends of the bottles. After the folding blades which have engaged the portions **52** and **53** have moved down, the folder **237** moves against flap **42** and folds it beneath the plate **197**. The clamps at the third station are retracted and the leading box **122** encompasses the package and moves it forward. The folded flap **42** will move up the inclined end of plate **251**, thus bringing the glued edge portion of this flap beneath the edge of flap **41** as the package moves to the fourth station.

While the package is at rest at the fourth station the package is again pressed snugly about the bottle group in a manner similar to that of the third station and while the clamps are in their holding position folding blades move up to raise the overlapping portions of the bottle retaining members to their upright position. At the same time the Y-shaped locking parts of flap **42** are pressed through the openings **44** in flap **41** by fingers **293**. The clamps, folding blades and lock operating fingers then move away from the package. The forming member, then having moved down, will engage the package at the fourth station and will push it onto the conveyor **23** by the pusher bracket **294**. As the conveyor moves a step forward the posts **299** on the narrow conveyor plates will move into position to hold the upfolded retainer member in vertical position while the adhesive sets.

From the foregoing it is apparent that the present invention provides an effective mechanism for the production of bottle packages in which the wrapper snugly encloses the bottles. By providing a conveying and forming member with package advancing boxes each of which is provided with a follower to bear upon the wrapper top panel this part of the wrapper is kept in the desired position as other portions of the wrapper are treated. At the third and fourth stations. The downward pressure that is applied to the top panel and the inward pressure applied by the clamping means tends to assure the correct infolding of the second bottom flap and overlapping of the two flaps as well as the correct upward folding of the retaining members which engage the end bottles of the packages. Further, by the transfer of the completed packages to the off-bearing conveyor equipped with small posts for engaging within the angles of the bottle retaining members and retaining these posts in such position until the adhesive has set, the production of an effective package is assured.

While the present description sets forth a preferred embodiment of the invention, numerous changes may be made in the construction without departing from the spirit of the invention, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

What is claimed is:

1. A machine for packing two rows of bottles or similar articles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps and narrow connecting panels between the top and sides and between the sides and bottom flaps, such narrow panels being adapted respectively to engage against the sloping shoulder portions and rounded lower portions of the bottles, such machine comprising, in combination, conveying means for advancing two rows of bottles in upright position along a fixed path, means for retaining a group of a predetermined number of bottles at an assembly station on said conveying means, means for applying adhesive along the free edge of a bottom flap of a carton of the type referred to, and means for assembling such carton with the die-cut openings in the top panel surrounding the necks of a group of bottles at the assembly station, forming and advacing means comprising an open-bottom, box-like element of a size to fit over the bottle group, guide means for the forming element for controlling its movement through a rectangular path in a vertical plane, one portion of the

path of the forming element on the guide means being vertically downward over the assembly station to encompass the bottle group to press the top panel against the shoulders of the bottles and fold the blank side panels about the sides of the bottle group, the second portion of the path of the forming element on the guide means being forwardly of the conveying path to advance the assembled bottle group and blank beyond the assembly station, the third portion of the path being vertically upward to remove the forming element from the bottle group, and mechanism effective after the bottle group has advanced beyond the assembly station for folding the bottom flaps into lapping relation against the bottoms of the bottles with the adhesive coated surface between the flaps.

2. A machine for packing two rows of bottles or similar articles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel, such blank being scored along parallel lines to define the top wall, side panels and bottom flaps, the free outer corners of each bottom flap being scored along diagonal lines extending across each corner, such lines at the corners of one bottom flap terminating in a slit to provide, at each of such corners, upwardly foldable, dihedral angle portions, and a second upwardly foldable portion on each corner of the other bottom flap adapted to be joined adhesively to the respective dihedral angle portions, such portions forming, when joined as the carton is set up, upstanding retaining members disposed centrally of the ends of the bottom to prevent outward displacement of the end bottles, such machine comprising in combination, supporting means for advancing thereon a group of two rows of bottles with the rows arranged parallel to the path of movement, and on which bottle group a wrapper blank of the type referred to has been placed in assembled relation therewith, having each side flap and attached bottom flap folded down about the sides of the bottle group and with one of the bottom flaps having had applied thereto a fresh coating of adhesive along its edge portion, means for folding the unglued bottom flap into supporting position beneath the row of bottles adjacent such flap, means acting in sequence for folding the adhesive coated flap into supporting position beneath the other row of bottles and in lapping relation with the opposite bottom flap, and means for folding upwardly the cooperating portions at the free corners of the bottom flaps, whereby said portions may be adhesively secured in permanently upstanding position.

3. A machine, as defined in claim 2, having combined therewith an off-bearing conveyor adapted to be advanced step-by-step not less than the width of a completed bottle package, and disposed with its path of travel at right angles to the path of travel of the bottle groups, intermittently operating means for moving a package endwise onto the off-bearing conveyor, said off-bearing conveyor comprising a plurality of groups of narrow plates extending transversely of its travel for supporting the packages transferred thereto, one of said plates located centrally of each group having spaced, upstanding, short posts thereon spaced to fit individually within the angle of the upright bottle retaining members to hold the cooperating portions of said members in contact during advance of the conveyor while the adhesive between the portions becomes set.

4. A machine as defined in claim 3, in which the groups of narrow plates are secured on sprocket chain links, rotatable sprockets for said chains, the axes of said sprockets being offset from the path of delivery of the packages in the direction of advancing movement of the off-bearing conveyor, such conveyor being brought to rest between its intermittent movements with the posts on the centrally located plates inclined on the contour of the sprockets, whereby the upper ends of the posts will remain below the general supporting surface of the off-bearing conveyor, and an independent, flat supporting member supported at the level of the conveyor and in close relation to the sprockets, whereby packages, when delivered endwise onto the off-bearing conveyor, are supported in part by a conveyor plate and in part by the independent supporting member.

5. In a machine for packing a group of two rows of bottles or similar articles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall to engage the sloping bottle shoulders, such blank having parallel scores therein defining side panels with narrow panels between the side and top panels arranged to bear on the sloping shoulders of the bottle group to be enclosed, the blank including bottom flaps adapted to be secured in lapping relation beneath the bottle group, the combination of means for supporting a bottle group to receive a blank of the type described with the necks of the bottles projecting through the die-cut openings in the top panel, an open-bottom, box-like forming element of a size to fit over the bottle group, means for moving the forming member down over the assembled blank and bottle group to fold the side panels to extend along the sides of the bottle group, a thin, elongated, stationary plate disposed in operative relation to the supporting means for the bottle group, means for moving the forming element into position longitudinally over said plate while encompassing the blank and bottle group to transfer the bottle group onto the plate, means for moving the forming element upwardly out of encompassing relation to the bottle group, a clamping element at a side of the plate mounted for in and out movement to clamp a narrow panel firmly against the sloping shoulder of the bottle group, means for moving the clamping element, a reciprocable bottom flap folder arranged to cooperate with the clamping element and having a folding bar extending lengthwise alongside the plate and arranged for limited inward movement transversely to the plate and in close relation to its under surface to fold a bottom flap inward beneath the plate, means for moving the flap folder to its folding position timed to operate while the clamping element is in clamping relation to the narrow panel.

6. In a machine for packing a group of two rows of bottles or similar articles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall to engage the sloping bottle shoulders, such blank having parallel scores therein defining side panels and bottom flaps with narrow panels between the side and top panels arranged to bear on the sloping shoulders of the bottle group to be enclosed and with additional narrow panels to bear on the rounded lower ends of the bottles, the bottom flaps being adapted to be secured in lapping relation beneath the bottle group, the combination of means for supporting a bottle group to receive a blank of the type described with the necks of the bottles projecting through the die-cut openings in the top panel, open-bottom, box-like forming element of a size to fit over the bottle group, means for moving the forming member down over an assembled blank and bottle group to fold the side panels to extend along the sides of the bottle group, a thin, elongated, stationary plate disposed in operative relation to the supporting means for the bottle group, means for moving the forming element into position longitudinally over said plate while encompassing the blank and bottle group to transfer the bottle group onto the plate, means for moving the forming element upwardly out of encompassing relation to the bottle group, a pair of upper and lower clamping elements at a side of the plate mounted for in and out movement to clamp the upper and lower narrow panels firmly against the respective sloping shoulder and lower rounded corner of the bottle group, means for moving the pair of clamping elements, a reciprocable bottom flap folder arranged to cooperate with the clamping elements and having a folding bar extending lengthwise alongside the plate and arranged for

limited inward movement transversely to the plate and in close relation to its under surface to fold a bottom flap inward beneath the plate, means for moving the flap folder to its folding position timed to operate while the clamping elements are in clamping relation to the narrow panels.

7. A machine for packing two rows of bottles within an open-end, wrap-around carton of the type comprising a rectangular blank having a central top wall formed with die-cut openings to receive the necks of bottles to be enclosed, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps, such machine comprising, in combination, a continuously operating conveyor for advancing a group of bottles in upright position along a fixed path, movable stop means for retaining a group of bottles at an assembly station at the discharge end of said conveyor, means for delivering a wrapper blank of the type referred to onto a bottle group at the assembly station, an open-bottom, box-like, forming and advancing element of a size to fit over the top and sides of the bottle group to press the top panel against the shoulders of the bottles and fold the side walls down about the sides of the bottle group, supporting and guiding means for the forming element to guide it from a position above the blank and bottle group vertically downward to encompass the blank and bottle group and thereafter to advance such group beyond the end of the conveyor, and mechanism for moving the stop means from its bottle engaging position prior to the movement of the forming element into full encompassing relation to the bottle group and wrapper blank.

8. A machine for packing two rows of bottles within an open-end, wrap-around carton of the type comprising a rectangular blank having a central top wall formed with die-cut openings to receive the necks of bottles to be enclosed, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps, such machine comprising, in combination, a continuously operating conveyor for advancing a group of bottles in upright position along a fixed path, movable stop means for retaining a group of bottles at an assembly station at the discharge end of said conveyor, displaceable blank supports adjacent the stop means and above the group of bottles held by the stop means at the assembly station, means for delivering a wrapper blank of the type referred to onto the displaceable supports, means for displacing the supports to release the blank onto a bottle group at the assembly station, an open-bottom, box-like, forming and advancing element of a size to fit over the top and sides of the bottle group to press the top panel against the shoulders of the bottles and fold the side walls down about the sides of the bottle group, supporting and guiding means for the forming element to guide it from a position above the blank and bottle group vertically downward to encompass the blank and bottle group and thereafter to advance such group beyond the end of the conveyor, and mechanism for moving the stop means from its bottle engaging position prior to the movement of the forming element into full encompassing relation to the bottle group and wrapper blank.

9. A machine for packing two row of bottles within an open-end, wrap-around carton of the type comprising a rectangular blank having a central top wall formed with die-cut openings to receive the necks of bottles to be enclosed, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps, such machine comprising, in combination, a conveyor for advancing a group of bottles in upright position along a fixed path to an assembly station adjacent the discharge end of the conveyor, displaceable blank supports disposed at a level above the group of bottles at the assembly station, means for delivering a wrapper blank of the type referred to onto the displaceable supports, means for moving the supports to release the blank onto a bottle group at the assembly station, and an open-bottom, box-like, forming and advancing element of a size to fit over the top and sides of the bottle group to press the top panel against the shoulders of the bottles and fold the side walls down about the sides of the bottle group, supporting and giuding means for the forming element to guide it from a position above the blank and bottle group vertically downward to encompass the blank and bottle group and thereafter to advance such group beyond the end of the conveyor, the means for moving the displaceable supports being timed to displace the supports immediately prior to the engagement of the forming element with the wrapper blank.

10. A machine for packing two row of bottles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps, such machine comprising, in combination, a conveyor for advancing a group of two rows of bottles in upright position to an assembly station at its discharge end, bottom flap folding mechanism located beyond the discharge end of the conveyor, including a fixed, elongated plate aligned with the conveyor to support a bottle group discharged from the conveyor, means for depositing a flat blank of the type referred to onto the bottles at said assembly station with the die-cut openings in the top panel surrounding the necks of the bottles, an open-bottom, box-like, forming and advancing element of a size to fit over the top and sides of the bottle group, guiding and supporting means for movably guiding the forming element from a position above the blank and bottle group vertically downward over such blank and bottle group to press the top panel against the shoulders of the bottles and fold the side walls down about the sides of the group, said guiding means being formed to guide the forming and advancing element beyond the discharge end of the conveyor and onto the elongated plate of the bottom flap folding mechanism.

11. A machine for packing two rows of bottles within an open-end, wrap around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed to allow the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps, such machine comprising, in combination, a conveyor for advancing a group of two rows of bottles in upright position to an assembly station at its discharge end, bottom flap folding mechanism located beyond the discharge end of the conveyor, including a fixed, thin, elongated plate aligned with the conveyor to support a bottle group discharged from the conveyor and including a transversely movable folder arranged to move inward closely below the plate, means for depositing a flat blank of the type referred to onto the bottles at said assembly station with the die-cut openings in the top panel surrounding the necks of the bottles, an open-bottom, box-like, forming and advancing element of a size to fit over the top and sides of the bottle group, guiding and supporting means for movably guiding the forming element through a closed, rectangular path, one portion of the path being from a position above the assembly station vertically downward over the blank and bottle group to press the top panel against the shoulders of the bottles and fold the side wall panels down about the sides of the group, the second portion of the path forming element on the guiding means being longitudinally of the conveyor and elongated plate to advance the assembled bottle group and blank from the assembly station on the conveyor and onto said plate, the third portion of the path of the guiding means being vertically upward to elevate the forming element and

leave the bottle group and wrapper on the plate, and means operable following the upward movement of the forming element to move the folder inwardly beneath the plate to fold one of the bottom flaps.

12. A machine for packing two rows of bottles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps and narrow connecting panels between the top and sides and between the sides and bottom flaps, such narrow panels being adapted respectively to engage against the sloping shoulder portions and rounded lower portions of the bottles, such machine comprising, in combination, a conveyor for advancing a group of two rows of bottles in upright position to an assembly station at its discharging end, bottom flap folding mechanism located beyond the discharge end of the conveyor, including a fixed, thin, elongated plate aligned with the conveyor to support a bottle group discharged from the conveyor, means for depositing a flat blank of the type referred to onto the bottles at said assembly station with the die-cut openings in the top panel surrounding the necks of the bottles, an open-bottom, box-like, forming and advancing element of a size to fit over the top and sides of the bottle group, guiding and supporting means for movably guiding the forming element through a closed, rectangular path, one portion of the path being from a position above the assembly station vertically downward over the blank and bottle group to press the top panel against the shoulders of the bottles and fold the side wall panels down about the sides of the group, the second portion of the path of the forming element on the guiding means being longitudinally of the conveyor and elongated plate to advance the assembled bottle group and blank from the assembly station on the conveyor and onto said plate, the third portion of the path of the guiding means being vertically upward to elevate the forming element and leave the bottle group and wrapper on the plate, means operable following the rising movement of the forming element to press the narrow panels against the bottle shoulders and the rounded bottom portions of the rows of bottles, and means operable while such narrow panel pressing means is in pressing position to actuate the bottom flap folding mechanism to fold a bottom flap inwardly beneath the plate.

13. A machine for packing two rows of bottles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panels, side panels and bottom flaps and narrow connecting panels between the top and sides and between the sides and bottom flaps, such narrow panels being adapted respectively to engage the sloping shoulder portions and rounded lower portions of the bottles, such machine comprising, in combination, means for grouping bottles, means for assembling a wrapper blank of the type described over a bottle group with the bottle necks projecting through the die-cut openings, means for pressing the top panel onto the shoulders of the bottles and simultaneously folding downward the side wall portions of the blank about the sides of the bottle group, and a pressing element having upper and lower, elongated portions each extending longitudinally of the carton side walls and movable toward the blank in a direction at right angles to the side walls for pressing inwardly lengthwise of the respective upper and lower narrow panels to bring them firmly against the bottle shoulders and rounded lower portions.

14. A machine for packing two rows of bottles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps and narrow connecting panels between the top and sides and between the sides and bottom flaps, such narrow panels being adapted respectively to engage the sloping shoulder portions and rounded lower portions of the bottles, such machine comprising, in combination, means for grouping bottles, means for assembling a wrapper blank of the type described over a bottle group with the bottle necks projecting through the die-cut openings, means for pressing the top panel onto the shoulders of the bottles and simultaneously folding downward the side wall portions of the blank about the sides of the bottle group, a thin, elongated, stationary plate for supporting the bottle group lengthwise of the rows, an elongated pressing element extending longitudinally of the carton side walls and parallel with the stationary plate, a support member on which the pressing element is mounted, said support member being movable in a lateral direction transverse to the length of the stationary plate to move the pressing element bodily transversely of such plate and laterally toward the carton side walls to bear uniformly lengthwise along a narrow panel to press it directly against the bottle shoulders, and means operable while the pressing element is bearing against the narrow panel for folding one of the bottom flaps beneath the stationary plate.

15. A machine for packing two rows of bottles or similar articles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel, such blank being scored along parallel lines to define the top wall, side panels and bottom flaps, the free outer corners of each bottom flap being scored along diagonal lines extending across each corner, such lines at the corners of one bottom flap each terminating in a slit to provide, at each of such corners, upwardly foldable, dihedral angle portions, and a second upwardly foldable portion on each corner of the other bottom flap adapted to be joined adhesively to the respective dihedral angle portions, such portions forming, when joined as the carton is set up, upstanding retaining members disposed centrally of the ends of the bottom to prevent outward displacement of the end bottles, such machine comprising, in combination, conveying means for advancing a group of two rows of bottles in upright position along a fixed path, means for retaining the group at an assembly point on said path, means for supporting a carton blank of the type referred to in position over a bottle group, such blank having had applied thereto a fresh coating of adhesive along the edge of a bottom flap, means for folding the side panels of the blank to lie along the sides of the bottle group, means for folding the unglued bottom flap into supporting position beneath the row of bottles adjacent such flap, means acting in sequence for folding the adhesive coated flap into supporting position beneath the other row of bottles and in lapping relation with the opposite bottom flap, and means for folding upwardly the cooperating portions at the free corners of the bottom flaps, whereby said portions may be adhesively secured in permanently upstanding position.

16. A machine for packing two rows of bottles within an open-end, wrap-around carton of the type comprising a flat, rectangular blank having a central top wall panel formed with die-cut openings of a size to receive the necks of the bottles to be enclosed and allowing the top wall panel to engage the sloping bottle shoulders, such blank being scored along parallel lines to define the top wall panel, side panels and bottom flaps and narrow connecting panels between the top and sides and between the sides and bottom flaps, such narrow panels being adapted respectively to engage the sloping shoulder por-

tions and rounded lower portions of the bottles, such machine comprising, in combination, means for grouping bottles, means for assembling a wrapper blank of the type described over a bottle group with the bottle necks projecting through the die-cut openings, means for pressing the top panel onto the shoulders of the bottles and simultaneously folding downward the side wall portions of the blank about the sides of the bottle group, a thin, elongated stationary plate for supporting the bottle group lengthwise of the rows, means movable toward the blank in a direction transverse to the stationary plate for pressing inwardly lengthwise against the upper narrow panel at one side of the plate to bring such narrow panel firmly against the adjacent bottle shoulders, said panel pressing means including an elongated wiping element mounted on a pivotal axis extending lengthwise of the

stationary plate and adjacent the rounded lower portions of the bottles, means for swinging the wiping element downwardly toward the score line between the narrow panel and the attached bottom flap of the carton blank to force the narrow panel progressively against the rounded bottle portions at the lower ends of the row of bottles, and means operable while the wiping element is bearing against the lower narrow panel for folding a bottom flap beneath the stationary plate.

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