United States Patent

Mahlstede et al.

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[45] **July 18, 1972**

[54] BOTTLE RINSING APPARATUS

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[21] Appl. No.: **745**

[52] **U.S. Cl.**.....**134/127**, 134/133, 134/152, 198/22, 198/33 AD

[51] **Int. Cl.**.....**B08b 3/02**, B08b 9/08

[58] **Field of Search**.....134/43, 62, 67, 68, 72, 73, 134/125–127, 134, 133–134, 152, 166, 171; 198/22, 22 B, 33 AD

[56] **References Cited**

UNITED STATES PATENTS

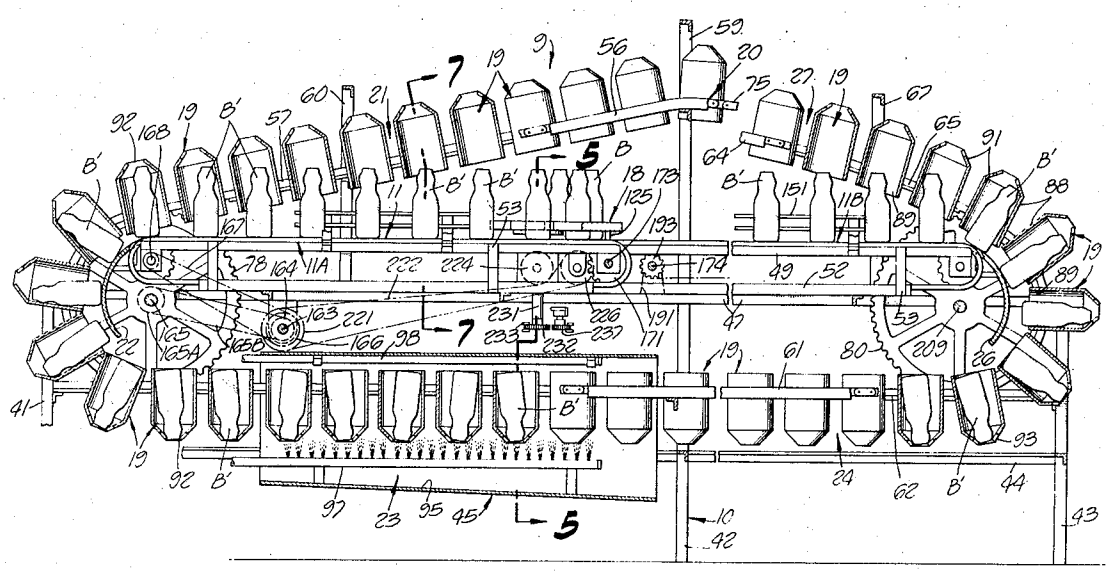
2,634,737	4/1953	Rowe	134/126 X
3,481,348	12/1969	Schultz	134/126
3,028,946	4/1962	Krupp et al.	134/131 X
2,381,798	8/1945	Benoit	198/22
3,292,646	12/1966	Pollock	134/67

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[57] **ABSTRACT**

Bottle rinsing apparatus wherein a first horizontal receiver conveyor carries upright bottles between the upper and lower runs of a continuous second conveyor which has a plurality of bottle receiving receptacles. The second conveyor has a first upper run segment in which receptacles are carried downwardly at an angle to the first conveyor so as to respectively encompass a bottle on the first conveyor. The encompassed bottles are inverted by the receptacle conveyor and passed over rinsing jets on a lower run segment of the second conveyor. Each bottle receptacle is open at both ends, with one end having a restricted opening to retain the bottle neck when the bottle is inverted, while still affording a path to the bottle interior for the rinsing jets and for drainage. The second conveyor has a second upper run segment in which the receptacles are carried upwardly at an angle adjacent a horizontal retrieval conveyor which receives the bottles in upright position from the receptacles.

12 Claims, 9 Drawing Figures



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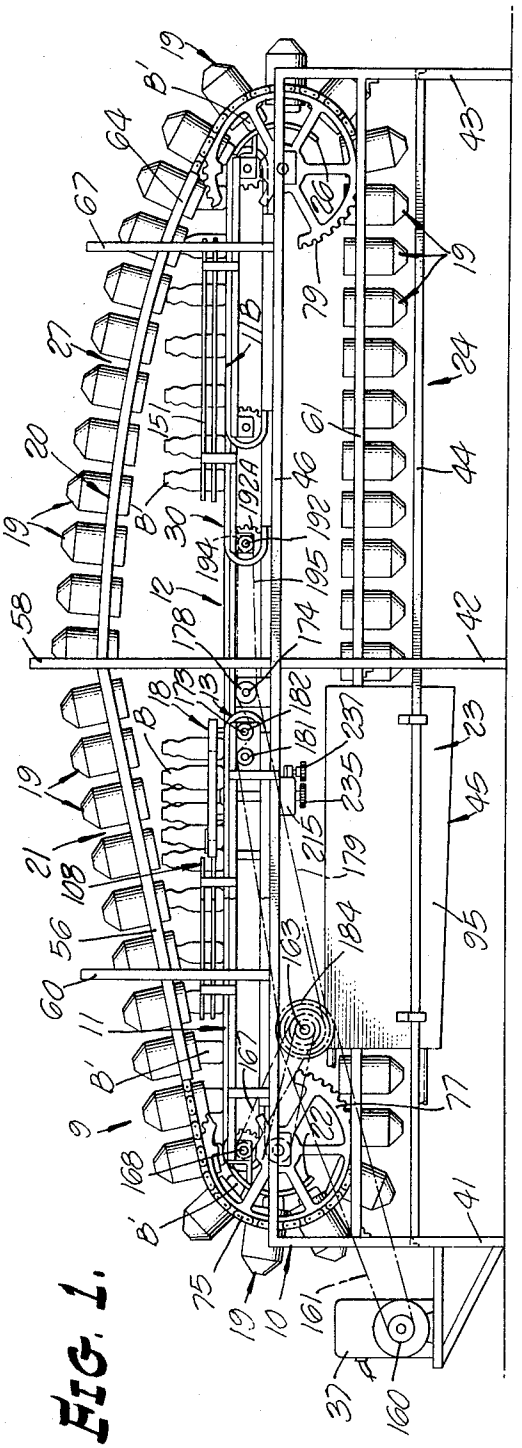


FIG. 1.

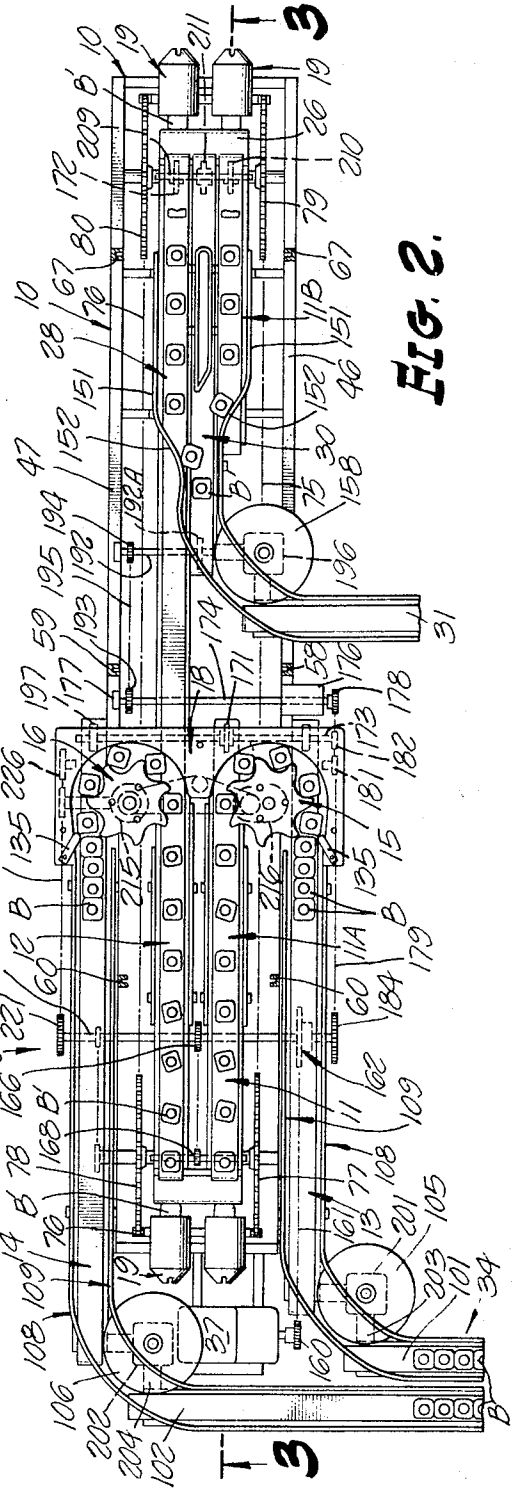


FIG. 2.

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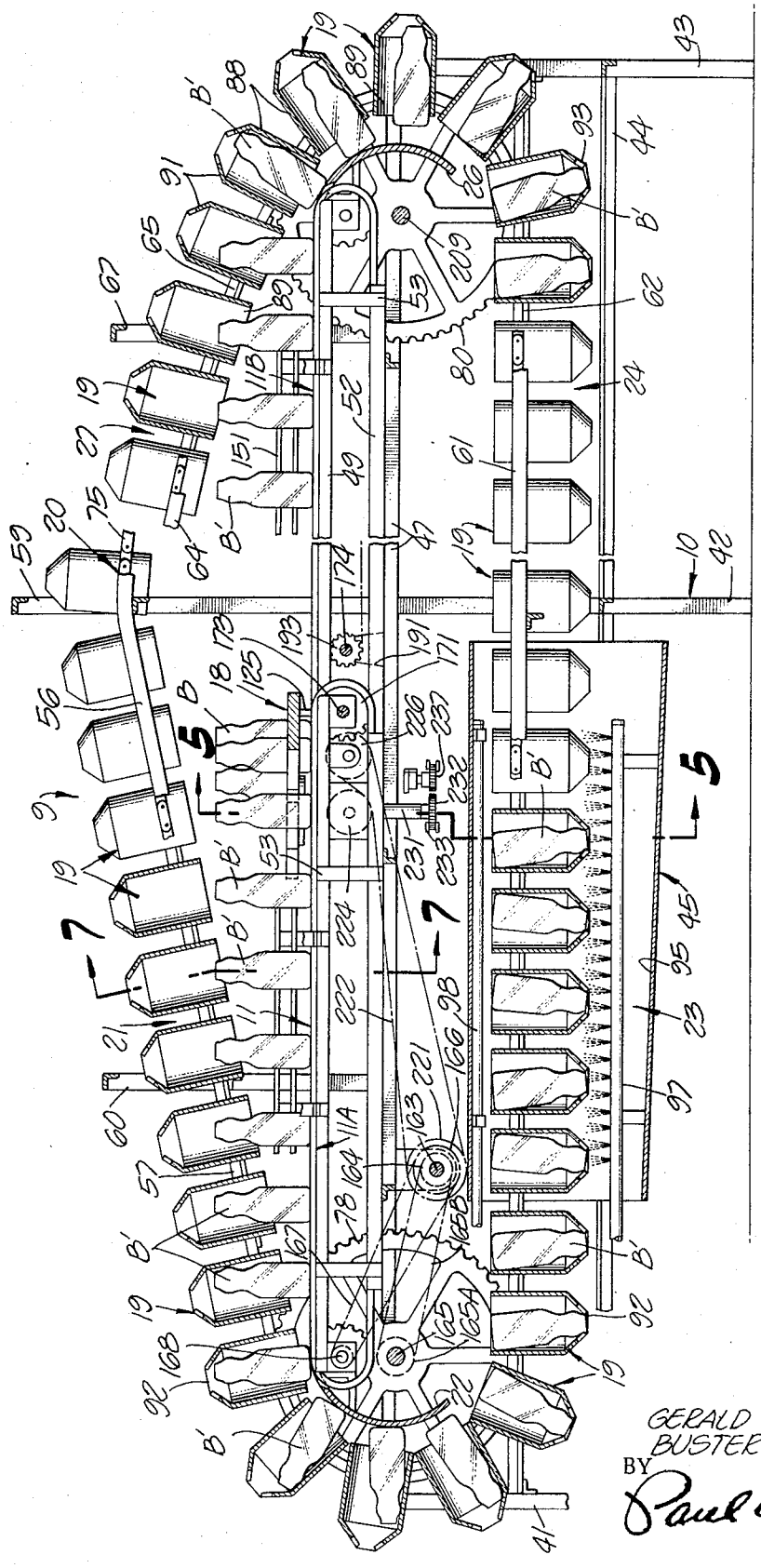
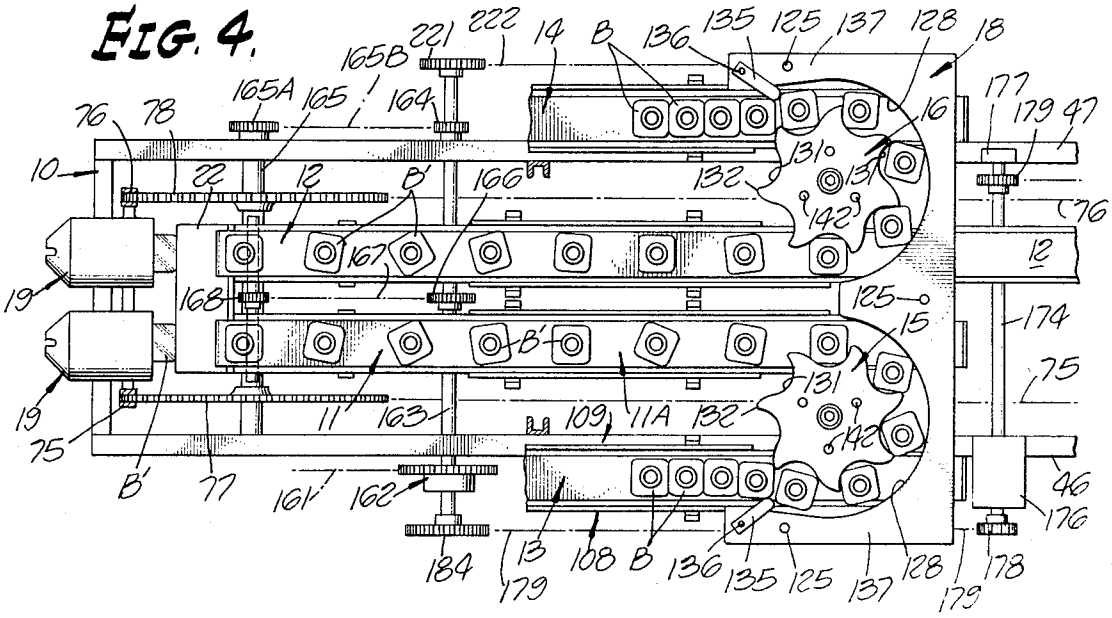


FIG. 3.

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FIG. 4.



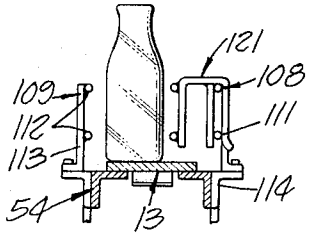


FIG. 9.

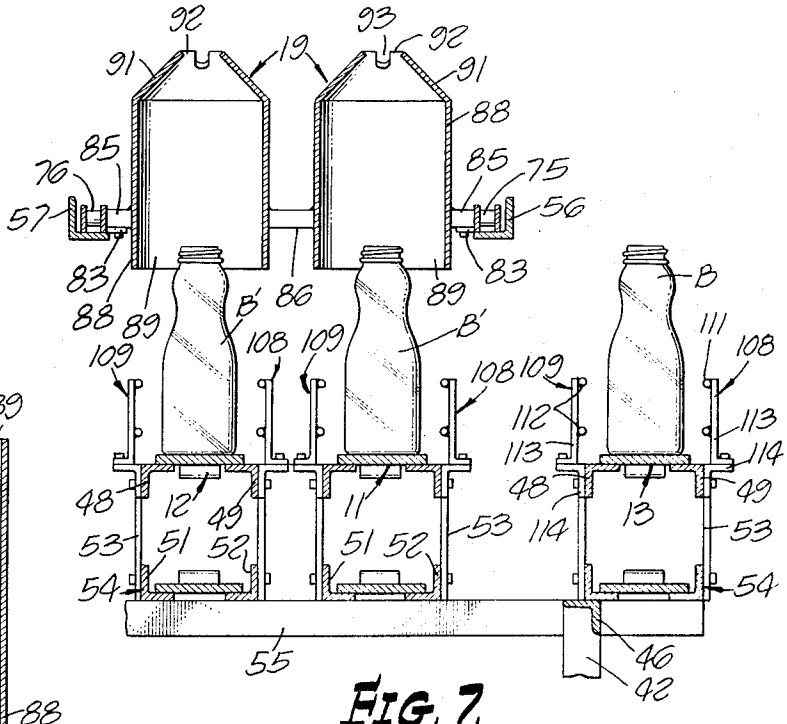


FIG. 7.

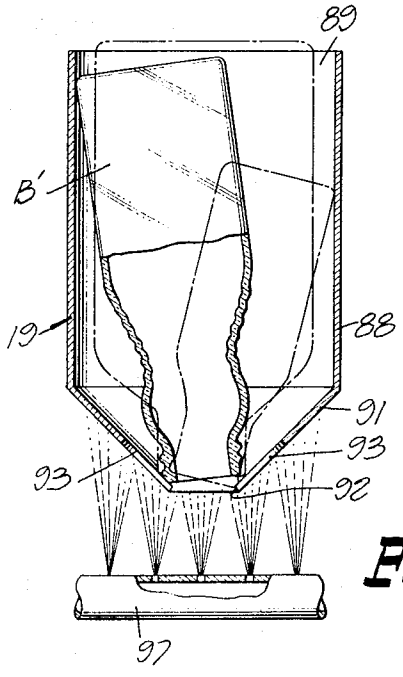


FIG. 8.

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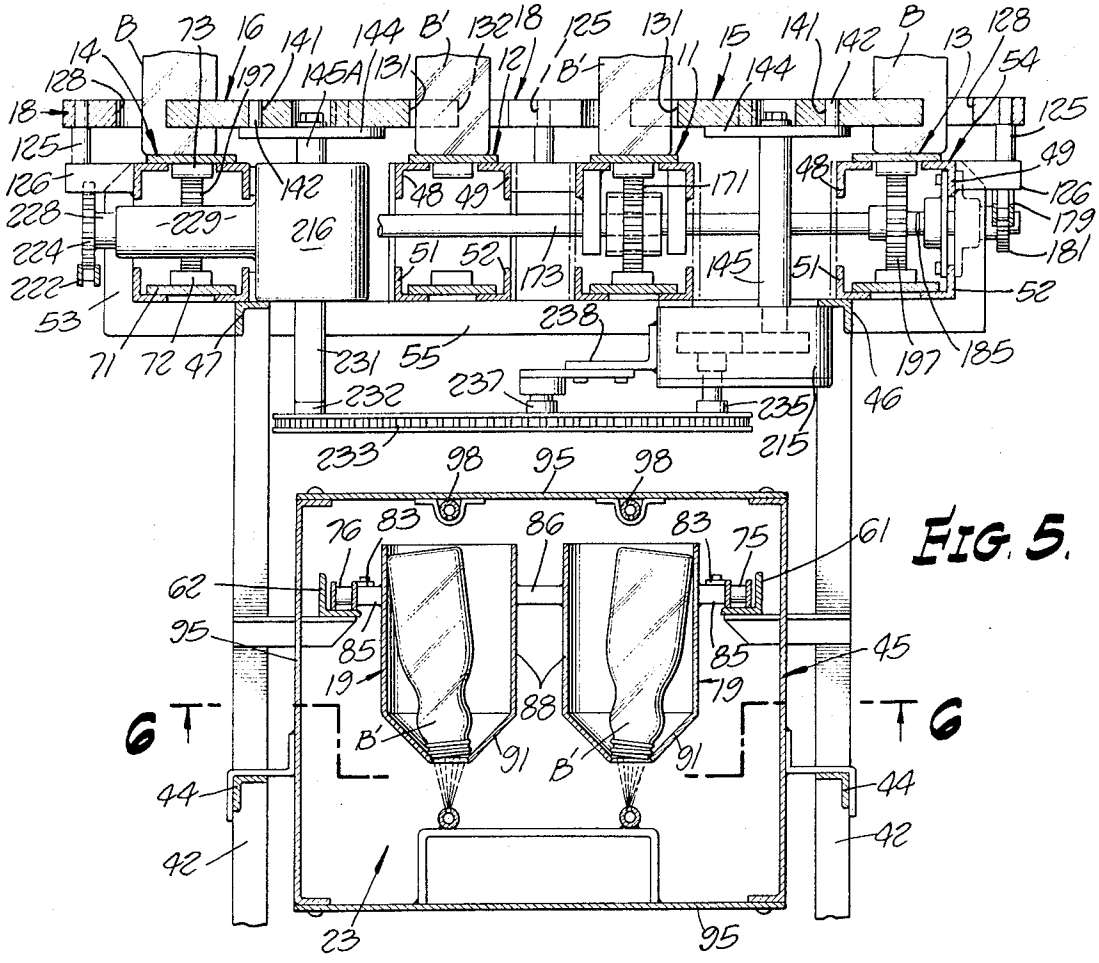


FIG. 5.

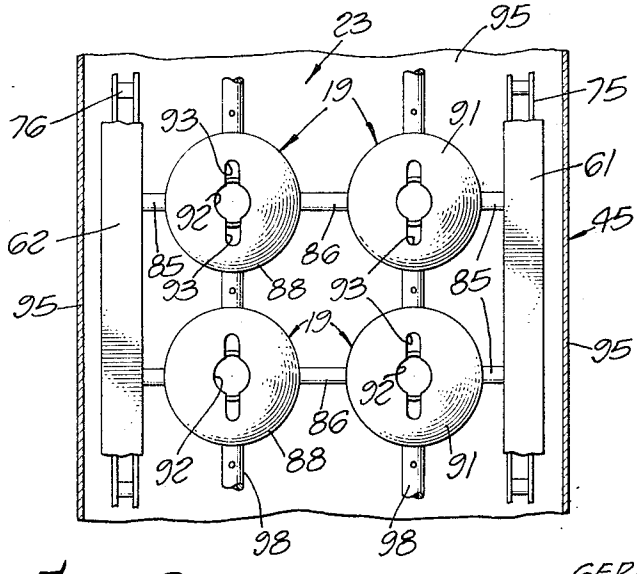


FIG. 6.

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BOTTLE RINSING APPARATUS

BACKGROUND OF THE INVENTION

The invention relates to container handling equipment and more particularly to apparatus for rinsing bottles and other containers.

It is conventional to wash or rinse used or new bottles prior to filling them with the desired liquids. Used containers are normally washed with a caustic solution. Some present washers have a rinsing sequence within the machine to remove the caustic. Others rinse the bottles at a separate station. New bottles are normally rinsed with a chlorine-water solution to insure sterility and make sure that no particles of cardboard or dirt from packaging and handling remain. In either case, the containers are normally rinsed in an inverted position with the bottle opening downward and exposed to one or more jet streams of the rinsing solution. The inverted position is maintained through a period commensurate with the time required to drain the bottle, then the container is positioned upright again for transmission to a filling station.

In general, containers such as used for fruit juice, milk and other liquid foods, and for medicines are of glass. Problems of breakage and chipping arise, however, in the case of glass containers due to the demand for high speed cycling of the containers through the wash, rinse and filling processes. In those machines in which the containers are moved from one position to another by reciprocating components, line speed is inhibited by the necessity of slowing the transfer stroke of the equipment, due to the frangible characteristics of the containers. In prior apparatuses, which depend upon plungers and other pushers for transferring the containers from one conveyor to another in order to invert and reinvert them, the container breakage rates may run as high as 30 percent. While the breakage problem has been alleviated somewhat by using containers made of tough plastics, the problem of breakage is still of major concern since a large percentage of the market continues to use glass containers because of their favorable public acceptance.

Another significant problem in container handling equipment results from the wide variety of container sizes and shapes which must be handled. In the case of fruit juice, for example, the containers may vary in size from 8 ounces to 64 ounces, and from approximately 6 inches to 10 inches in height. The variety is also increased materially by the different exterior configurations of the containers, which may include round, rounded rectangles, substantially square, or other cross sectional shape. Thus, it will be apparent that in order to meet exacting present-day requirements, equipment for processing containers must be flexible in operation and capable of rapid change-over to accommodate containers of varying diameter, height, and configuration.

The present invention solves the inherent problems of the prior apparatus by providing container handling equipment which is not only capable of rapidly processing the containers but also moves the containers from one processing stage to another without subjecting them to conditions conducive to breakage, and which is adapted to receive a wide range of container sizes and shapes with minimal machine adjustment.

SUMMARY OF THE INVENTION

Briefly, the invention contemplates improved apparatus for handling open-end containers, such as a bottle rinsing machine, which comprises container feeding means for delivering containers to a first horizontal receiver conveyor which transports the containers while in an upright position between runs of a continuous second conveyor which passes around the first conveyor. The second conveyor carries a plurality of container receiving receptacles which are open at both ends and have one end with a restricted opening. The second conveyor has a first upper run segment wherein the receptacles approach the first conveyor at a downwardly inclined angle such that the open receptacles gradually encompass upright containers on the first conveyor and guidingly transports them to an inverted position in a lower run which carries them through a rinsing jet spray and a draining stage. An arcuate guide at one end of the horizontal conveyor guides the containers into the receptacles. A second arcuate guide at an opposite end of the receptacle conveyor guides the containers onto a horizontal retrieval conveyor as the receptacles are gradually moved away in an upwardly inclined angle of a second upper run segment and the containers are left in an erected position upon the horizontal conveyor. Guide means divert the upright rinsed containers from the horizontal conveyor to a removing conveyor which may deliver the containers for further use to another station.

Preferably, a star wheel is used to transfer the containers in longitudinally spaced relation from a feed-in conveyor to the first horizontal conveyor. A single drive unit propels the star wheel, the first conveyor, and the second receptacle conveyor such that the two conveyors are synchronous in their movement despite their disparity in travel. The first and second conveyors may be duplicated to accommodate two or more rows of containers, each of which moves the containers through a rinsing position. The number of rows is predicted upon demand and good engineering practices.

It is one object of the present invention to provide unique means in apparatus for washing and rinsing bottles, wherein the bottles are moved from one stage to another by associated components in such manner that bottle breakage will be reduced to a minimum, or substantially eliminated.

A further object of the invention is to provide container handling apparatus wherein containers on one conveyor are successively encompassed by receptacles on another continuous conveyor as a result of the relative movement of the conveyors, and by which the containers are transferred from an upright position to an inverted position.

It is a further object of the invention to provide rinsing apparatus, wherein containers of a variety of sizes and shapes may be accommodated by means of simple adjustments of interchangeable components of the apparatus.

A still further object of the invention is to provide container handling apparatus wherein conveyor-carried container-receiving receptacles are utilized for inverting the containers, and are adapted to receive a wide range of containers of different configuration without having to alter the receptacles on the conveyor.

These and other advantages of the invention will be apparent from the following detailed description and drawings in which certain parts have been deleted to simplify the illustration.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal side elevational view of a bottle rinser embodying the herein described invention, portions being broken away for clarity;

FIG. 2 is a plan view of the embodiment shown in FIG. 1, the upper runs of the receptacle conveyor being removed;

FIG. 3 is an enlarged longitudinal sectional view, taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary plan view of the feed-in end of the bottle rinser, certain portions being broken away;

FIG. 5 is a transverse sectional view, taken substantially along line 5—5 of FIG. 3;

FIG. 6 is a fragmentary plan sectional view, taken substantially along line 6—6 of FIG. 5;

FIG. 7 is a fragmentary generally vertical sectional view, taken substantially along line 7—7 of FIG. 3;

FIG. 8 is an enlarged fragmentary detail view illustrating a receptacle and container in a rinsing position, parts being in section and other parts being cut away for clarity; and

FIG. 9 is a fragmentary detail view, partly in section, and showing a container on the feed-in conveyor.

DESCRIPTION OF A PREFERRED EMBODIMENT

General Configuration

The illustrated bottle rinsing machine as generally indicated at **9** has a framework **10**, and includes duplicate conveyor lines in order to increase the unit capacity of the machine. Parallel horizontal conveyors **11** and **12**, supported on the framework, are fed on opposite sides from feed conveyors **13** and **14**, respectively. A star wheel **15** transfers upwardly opening containers B from the feed conveyor **13** to the horizontal conveyor **11** and a star wheel **16** transfers containers between feed conveyor **14** and conveyor **12**. The horizontal conveyor **11** has two portions **11A**, **11B**, of which portion **11A** receives the containers from the feed conveyor and portion **11B** retrieves the containers from the receptacle conveyor.

A guide yoke **18** spans the horizontal conveyors and partly surrounds each star wheel. Both the star wheels and the guide yoke are quickly replaceable by other star wheel pairs and guide yokes to adjust the machine to containers of varying sizes and configurations. Each star wheel pair and guide yoke set adapts the machine to a particular range of container variations.

A plurality of container receptacles **19** are carried in tandem by a receptacle conveyor **20** down a converging run segment **21** and about a curving guide plate **22** at one end of the rinsing machine and thence through a rinse station **23** and a drain run **24**. The receptacle conveyor then carries the receptacles about a curving guide plate **26** at an opposite end of the rinsing machine and upon an upwardly diverging run segment **27** above conveyor retrieval segments **28** and **11B** of the parallel horizontal conveyors. The receptacle conveyor **20** is continuous about the horizontal conveyors and travels in the same direction.

A transfer conveyor **30** receives containers from the retrieval segments **28** and **11B** and delivers them to a removal conveyor **31** from which the rinsed containers proceed to the next operation.

Containers are supplied at a loading station **34** where feed conveyors **13** and **14** are adjacent. The containers B spaced upon the horizontal receiver conveyors by the star wheels **15** and **16** are gradually received by the receptacle conveyor during the angularly downward run **21** of the receptacle conveyor. The transfer of the containers from the horizontal conveyors to the receptacles is accomplished by cooperation between the receptacles **19** and the curving guide plate **22** as the receptacle conveyor traverses the end of the rinsing machine. The containers are partially inverted during the traverse of the guide plate and proceed through the rinse station with the container openings downward to receive the rinse liquid. After the containers traverse the drain run segment **24** of the return run of the receptacle conveyor, they are retrieved by the horizontal conveyors after circling about the opposite end of the rinsing machine and being guided by curved guide **26** into upright position upon the retrieval segments of the horizontal conveyors. The receptacles gradually remove from the erected containers during their traverse of the upwardly angled diverging run segment **27** of the receptacle conveyor.

A vari-speed drive unit **37** drives all of the conveyors and star wheels of the rinsing machine **9**.

DETAILED DESCRIPTION

The framework **10** of rinsing machine **9** has transverse pairs of legs **41**, **42**, **43** spaced longitudinally of the machine. Transversely spaced lower stringers **44** join the legs and support a rinse tank **45**.

An upper pair of transversely spaced stringers **46**, **47** extend the length of the frame and support a conveyor guide box for each of the horizontal conveyors **11**, **12** and the feed conveyors **13**, **14**. Each conveyor box is comprised of longitudinally extending angle irons **48**, **49**, **51**, **52** at each corner of the defined box and longitudinally spaced vertical spacers **53**. For instance, a guide box **54** for the feed conveyor **13** has upper parallel angles **48**, **49** and lower parallel angles **51**, **52**. The lower angles are supported from the frame by cross braces such as the cross brace **55** of FIG. **5**. The upper angles of each guide box are supported by the vertical spacers **53**.

A pair of receptacle conveyor guide angles **56**, **57** extends downwardly toward the horizontal conveyors from a pair of central vertical supports **58**, **59**. A vertical brace **60** on each of the guide angles intermediate its run helps support each guide angle from the frame **10**.

A pair of intermediate longitudinal stringers **61**, **62** guides the receptacle conveyor on its return run between downwardly converging run **21** and the upwardly diverging run segment **27** along spaced parallel angles **64**, **65**. The angles **64**, **65** are each supported by a vertical brace **67** rising from one of the longitudinal stringers **46**, **47**.

Preferably, the feed conveyors, the horizontal conveyors and the receptacle conveyor are chain conveyors driven by conventional chain sprockets. The feed and horizontal conveyors are preferably metallic articulated belts fixed to the chain links and edge-guided by the guide angles. For instance, feed conveyor **14** has a plurality of metallic belt links **71** each fixed to one or more chain links **72** of a conveyor drive chain **73**. Conveyors **11**, **12** and **13** are similarly comprised, guided and driven.

The receptacle conveyor **20** has transversely spaced conveyor drive chains **75**, **76** which are carried in a continuous path by the aforesaid guide angle pairs **56**, **57** and **61**, **62** and **65**, **66**, as well as by pairs of end sprockets **77**, **78** at the left end of FIG. **2** and end sprockets **79**, **80** at the right end of FIG. **2**. At intervals of about 7½ inches along the extent of each chain are attachment tabs **83**. Each attachment tab receives a stub rod **85** which is fixed to the periphery of one of the tandem receptacles **19**. The receptacles of each tandem pair on the receptacle conveyor are centrally connected by a central support rod **86** (FIG. **5** and FIG. **7**). It can be appreciated that the number of side-by-side receptacles can be increased to match the number of horizontal conveyors like the conveyors **11** and **12** desired to deliver the requisite number of container units.

Turning again to FIG. **7**, each receptacle **19** has a cylindrical wall portion **88** with an open end **89** and a restricting cone **91** at its opposite end. The cone **91** has a diminished opening **92** from which central slots **93** extend in each direction along the run of the conveyor. The diameter of cylinder **88** is determined by the cross section of the largest container for which the conveyor is designed. The opening **89** is large enough to encompass the largest container as the receptacle converges with an upright container upon the horizontal conveyor with which the receptacle is associated.

Diminished opening **92** is determined by the opening of the smallest container for which the rinsing machine is projected. As can be seen from FIG. **8**, the preferred attitude of a container within a receptacle is one in which the inner walls of cylinder **88** determine the vertical angle of the container, while the inner surface of restricting cone **91** supports the open end of the bottle within the receptacle.

The connections between the receptacles and the receptacle conveyor chains are such that the perpendicular axis attitude of each receptacle is maintained with respect to the plane of movement of the conveyor throughout the transverse of the conveyor chains about the machine cycle. In FIGS. **5** and **6** the containers are shown in a common attitude within the receptacles as they pass through the rinse tank **45**. The rinse tank is preferably closed by exterior walls **95**, the bottom wall of which slopes for drainage of the rinse liquid. A pair of lower spray tubes **97** direct liquid jets upwardly into the passing containers through the openings **92** and slots **93**. If desired, a pair of upper spray tubes **98** may be used to direct liquid against the container exteriors.

With containers within the design range of the machine, it is not necessary to change the receptacle conveyor to process

different containers. However, since receptacle spacing on the receptacle conveyor is set, it is necessary to control the spacing of containers delivered to the horizontal conveyors to synchronize with the spacing of the receptacles along the line of travel. In the illustrative embodiment, such spacing is achieved by a star wheel-implemented transfer between the feed conveyors **13** and **14** and the respective horizontal conveyors **11** and **12**. Containers such as the bottles B placed on the feed conveyors at loading station **34** are transferred from loading station belts **101**, **102** to the feed conveyors by conventional rotating pans **105**, **106** which are also driven from the vari-speed drive unit **37**.

The containers progress between guide fences **108**, **109** which extend from the loading station to the star wheels and the guide yoke at the transfer point between the feed conveyors and the horizontal conveyors. As can be seen from FIG. **7**, each guide fence comprises two vertically spaced, parallel rails **111**, **112** supported at intervals by vertical supports **113** rising from brackets **114** fastened to the upper guide angles of each conveyor guide box.

As can be seen from FIG. **9**, the transverse placement of the container upon the feed conveyor may be altered by an auxiliary guide fence such as the fence **121** which may be suspended from the outer guide fence **108** on either of the feed conveyors in accordance with the size of the container. The auxiliary guide fences insure proper delivery position of each container to the point where the star wheel imposes upon the container.

The guide yoke **18** is supported from the framework **10** by a plurality of stepped upright pins **125** which rise from support stubs **126** extending from the upper guide angles of the conveyor guide boxes. Each guide yoke has an arcuate inner vertical surface **128** substantially concentric with each star wheel. In conventional fashion, each star wheel has container receiving pockets **131** between each of its star points **132** which receive and space the containers apart. In order to insure an interval between succeeding abutted containers as delivered to the star wheel, a spacing finger **135** is adjustably secured by a screw **136** to a limb **137** on each outer end of the guide yoke. Each of the feed conveyors **13**, **14** has a greater surface speed than the peripheral velocity of the star wheel. Thus, containers B arrive at the spacing finger **135** in abutted relationship. If the conveyor belt is metallic as is preferred, a soap solution can be spread on the belt surface such that the conveyor slides smoothly beneath the containers which are arrested at the spacing finger.

The inner arcuate surface **128** of each guide yoke section confines the containers within the pockets **131** of each star wheel such that they are transferred to the receiving portion of each horizontal conveyor in a spaced relationship commensurate with the spacing of receptacles **19** on the receptacle conveyor.

The guide yoke **18** can be easily elevated from the securing pins **125** and a second guide yoke placed on the pins to rapidly adjust the machine for containers of differing sizes and configurations. Normally, the star wheel pair **15**, **16** is changed at the same time as is the yoke. Each of the star wheels has a plurality of pin apertures **141** which engage with a like number of pins **142** fixed to a drive disc **144** which is turned by a vertical shaft **145** engaged with a geared drive unit. Thus, the star wheels, too, may also be vertically disengaged from the drive disc and replaced with star wheels having pockets and points commensurate with the configuration of the differing container to be processed by the rinsing machine.

The guide fence arcuate surfaces **128** of each guide yoke are correlated with the star wheel pair with which they cooperate to place properly upon the horizontal conveyors the containers of differing configurations. The containers preferably are placed centrally on the longitudinal axis of the horizontal conveyor and at intervals commensurate with the space between converging receptacles as the receptacle conveyor carries the receptacle pairs along guide angles **56**, **57** to near convergence with the horizontal conveyors. As each bottle of the line of bottles B′ on each horizontal conveyor is approached by a converging receptacle, the receptacle gradually surrounds the container, as shown in FIG. **3**, until the container is almost completely enveloped. At the leftward end of the horizontal conveyor in FIG. **3**, the bottom of each container transfers from the horizontal conveyor to a bearing position against the curving guide plate **22**. The guide plate is eccentric with respect to the horizontal conveyor such that it is approached by the receptacle with a resultant thrusting of the container further into the receptacle. As the receptacle conveyor progresses about sprocket wheels **77**, **78**, gravity impels each container further into a receptacle such that the neck of the bottle or other container lodges within the restricting cone **91** of each receptacle. As can be seen from FIG. **3**, this results in substantial alignment of the bottle opening (FIG. **6**) with the diminished opening **92** of each receptacle.

As the receptacles of the receptacle conveyor continue through the rinse tank **45**, jets of rinsing liquid from the spray tubes **97** enter the receptacle and the container through their respective downward openings. If it is desired to thoroughly rinse the exterior of the containers, jets from the spray tubes **98** on the upper wall of the rinse tank may be activated also. The container exterior is also bathed by the jet from the lower spray tubes because of the elongate slots **93** in the cones **91** of each receptacle.

As the receptacles and their containers progress from rinsing tank **45**, the conveyor path is yet horizontal and the containers drain, as do the receptacles.

The sprocket wheels **79**, **80** guide the conveyor chains of the receptacle conveyor about the right end of the horizontal conveyors. In the transit about the sprocket wheels the receptacles are turned such that their openings **89** are downward. During the transition in vertical orientation the containers tend to slide on the cylindrical wall of the receptacles and lodge against guide plate **26**. Thus, at the transfer point where the receptacle conveyor begins its upward divergence from the horizontal conveyors, the containers are in contact with the horizontal conveyor. They are transported thereby in spaced relationship toward transfer conveyor **30** at the same time that the divergence of the receptacle conveyor removes the receptacles from about each container.

Each of retrieval segments **28** and **11B** of the horizontal conveyors has an outer fence **151**. Each fence has an inward baffle **152** which directs containers on the conveyors to the transfer conveyor **30**. The baffles are placed in staggered relationship along the path of the conveyor such that the containers transfer to the conveyor **30** at different points. The two lines of containers may thereby be merged into a single line.

A conventional rotating pan **158** across which fences **151** continue, turns the containers from transfer conveyor **30** to a removal conveyor **31** for transport to the next processing step.

THE DRIVE SYSTEM

As stated previously, the various components of the rinsing machine **9** are driven from a common power source which is preferably a vari-speed drive unit **37**. A drive sprocket **160** on the output shaft drives a chain **161** which turns a sprocket-clutch assembly **162** on a jack shaft **163** journalled on the framework **10** of the machine. Chain **161** and all other chains are schematically indicated by broken lines. The clutch may be an override clutch which protects the components of the machine in case of conveyor jamming.

A sprocket **164** on jack shaft **163** turns an axle **165** of the end sprockets **77**, **78** of the receptacle conveyor **20** by means of an axle sprocket **165A** and a chain **165B**. The shaft **163**, which extends across the width of the horizontal and feed conveyors, also turns a sprocket **166** which a sprocket chain **167** links to a shaft and sprocket assembly **168** journalled on the guide boxes of the conveyors. The shaft **168** powers horizontal conveyors **11**, **12** which have terminal sprockets **171**, **172** respectively at the rightward end of their runs as seen in FIG. **2**.

The sprocket 171 is free-turning on a feed conveyor drive shaft 173. A transfer shaft 174, is journalled by bearing mounts 176, 177 supported from stringers 46. Shaft 174 has a conventional sprocket 178 driven by a chain 179. Chain 179 passes over an idler sprocket 181 and under a driving sprocket 182 from a jack shaft sprocket 184, exteriorly of the feed conveyor 13. The idler sprocket 181 is supported by a stub shaft 185 (see FIG. 5) and serves to turn the chain about sprocket 182.

The chain 179 continues around the sprocket 178 to power shaft 174 which in turn drives a secondary transverse shaft 192 by means of sprockets 193, 194 and sprocket chain 195. A sprocket 192A shown midway of shaft 192 drives the transfer conveyor 30 in conventional fashion, while a gear box 196 transmits power from shaft 192 to the rotating pan 158 and the removal conveyor 31.

The aforesaid sprocket 182 is driven oppositely to sprocket 178 because of the reversal of the chain 179 about sprocket 182, impelling the drive shaft 173 clockwise as viewed in FIG. 1 to drive the feed conveyors 13, 14 oppositely to the horizontal conveyors 11, 12 by means of chain sprockets 197 on shaft 173.

In conventional fashion, the terminal sprockets (not shown) at the end of each feed conveyor 13, 14 are utilized to power gear boxes 201, 202, which rotate rotating pans 105, 106, respectively, and, through shafts 203, 204, provide power to feed conveyors 101, 102, respectively, from loading station 34. As stated heretofore, the feed conveyors deliver containers to the star wheels at a greater rate than the star wheels deposit the containers on the horizontal conveyors. The speed relationship is achieved by the relative ratios of the drive sprockets to the driven sprockets of the differing conveyors.

In the illustrative embodiment the horizontal conveyor 11 has a receiving portion 11A and a retrieving portion 11B. The conveyor portion 11B is driven from the terminal sprocket 172 of the conveyor 12 by a shaft 209 and a sprocket 210 shown in dotted lines in FIG. 2. The drive elements of the conveyor 30 are geared to drive it at approximately 50 percent greater lineal speed than the speed of the conveyor portions 11B and 28. The terminal sprocket 211 of the conveyor 30 idles on the shaft 209.

The conveyor portions 11B, 28 obviously travel at the same speed as conveyors 11 and 12, with the speed of receptacle conveyor 20 being calculated for coincidence between the containers spaced on the receiving portions of the conveyors 11 and 12. The spacing is achieved by star wheels such as the wheels 15, 16. The wheels are removably secured on drive discs 144. The vertical shafts 145, 145A of the drive discs rise from gear boxes 215, 216 of star wheels 15, 16, respectively.

The drive system for the star wheels is best seen with respect to FIGS. 3 and 5. The jack shaft 163 which is turned from the vari-speed drive unit 37 has a second drive sprocket 221 about which a sprocket chain 222 encircles and passes to the lower side of a drive sprocket 224 and about an idler sprocket 226. The sprocket 224 is mounted to a stub shaft 228 which extends from an elongate hub 229 of the star wheel gear box 216. In addition to the drive shaft 145A which drives star wheel 16, box 216 has a lower drive shaft 231 to which a sprocket 232 is attached. A sprocket chain 233 passes about sprocket 232 and extends to a sprocket 235 which extends downwardly from the gear box 215 which drives star wheel 15. An idler sprocket 237 journalled from an extending bracket 238 of the gear box 215 adjusts sprocket chain tension.

Gear box 215 contains a gear train which reverses the direction of drive shaft 145 with respect to the drive shaft 145A of star wheel 16.

The chain links and sprocket sizes are coordinated to achieve the mechanical purposes of the machine such that containers are always presented to the spacer fingers 136 so that the star wheel points intrude between and not against adjacent containers to prevent fracturing. Also, the speed and spacing of containers on the horizontal conveyors are such that the receptacles on the converging portion of the receptacle conveyor arrive over each of the spaced containers on the horizontal conveyor. By utilizing a single drive unit, with each of the components of the machine mechanically linked to the other components, the machine need not be adjusted to increase or decrease the production speed since the various components are mechanically coordinated. The change of star wheels and guide yoke sets to accommodate varying container sizes will not alter the spacing of the containers on the horizontal conveyor, but maintain that spacing despite the container configuration and insure proper transverse placement of the containers on the horizontal conveyors.

The machine speed may be altered by adjustment of the vari-speed drive unit 37 and the invention may be applied to machines of one or more parallel horizontal conveyors by matching the transverse components in terms of receptacles and conveyors.

The invention, therefore, is not limited to the illustrative embodiment described herein, but is rather defined by the appended claims.

We claim:

1. Apparatus for handling containers having an open end, comprising a first conveyor for containers, said conveyor having receiver and retrieval portions, means for feeding containers in an upright position in spaced relationship onto the receiver portion of the first conveyor, a second conveyor having converging and diverging run segments with respect to the first conveyor and a return run segment between the terminals of the diverging and converging run segments; a plurality of container receiving receptacles carried by the second conveyor, each of said receptacles having open ends one end of which is a restricted opening; means for propelling the first conveyor and the second conveyor such that successive containers on the first conveyor are encompassed by successive receptacles on the converging run segment of the second conveyor such that the opening of the container lodges at the restricted opening of the receptacle during the traverse by the receptacle of the return run of the second conveyor; rinsing means adjacent the second conveyor for a portion of the return run, said second conveyor diverging from the retrieval portion of the first conveyor such that the containers transfer from the receptacles into upright position upon the retrieval portion, and means for removing the containers from the first conveyor retrieval portion.

2. Apparatus in accordance with claim 1 wherein the means for supplying containers to the first conveyor comprises a feed conveyor, and a rotating star wheel transferring containers from the feed conveyor to the first conveyor.

3. Apparatus in accordance with claim 2 further comprising spacing means for establishing a small interval between adjacent containers at the point of contact with the star wheel.

4. Apparatus in accordance with claim 2 further comprising a guide fence leading from the feed conveyor around the star wheel to the first conveyor.

5. Apparatus in accordance with claim 4 further comprising drive means for the star wheel, support means for the guide fence, each of said drive means and support means having locator pins adapted to mate respectively with a star wheel and a guide fence such that the star wheel and guide fence may be readily removed and replaced.

6. Apparatus in accordance with claim 1 wherein each receptacle comprises a cylinder having an open end, a conical wall opposite the open end and a restricted opening terminating the conical wall, the open end of the receptacle being closer to the first conveyor than the restricted end.

7. Apparatus in accordance with claim 1 wherein a curving guide plate intervenes between the first conveyor and the second conveyor at each end of the second conveyor.

8. Rinsing apparatus for containers with top openings, comprising: a first horizontal conveyor having spaced receiving and retrieval portions, a second conveyor having a portion converging towards said receiving portion, a portion diverging away from said retrieval portion, and return run portion, means for applying a rinse liquid to the containers, means

feeding containers to the first conveyor at spaced intervals; said second conveyor having means operative at said converging portion for removing said containers from said first conveyor, inverting them over the rinse applying means, and restoring them at said diverging portion in an upright position to the first conveyor.

9. Apparatus in accordance with claim 8, which includes a feed conveyor, and means for transferring containers therefrom which comprises a star wheel and a guide bar extending from said feed conveyor about a portion of the star wheel to said first conveyor.

10. Apparatus in accordance with claim 9 further comprising quick-change fasteners securing said star wheel and said guide bar in place.

11. Apparatus in accordance with claim 10 wherein said quick-change fasteners comprise vertical support pins extending into apertures in the star wheel and the guide bar.

12. Bottle rinsing apparatus, comprising: a first conveyor for moving received bottles in an upright position along a horizontal path; a second conveyor having a path portion movable in one direction above the first conveyor and a path portion movable in a generally opposite direction below the first conveyor; cylindrical bottle receiving receptacles having a restricted opening at one end carried by said second conveyor; means for relatively moving the second conveyor with respect to the first conveyor so that the receptacles successively encompass the upright bottles in the path portion above the first conveyor and transport the bottles to an inverted position in the path portion below the first conveyor, in which latter position the bottles have their open ends positioned in the downwardly disposed restricted openings of the receptacles; and means for applying rinsing jets of liquid into the receptacles and bottles while in said inverted positions.

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