Nov. 10, 1964 W. J. LA COUNT ETAL 3,156,360

BEVERAGE BOTTLE SORTERS

Filed June 9, 1960 3 Sheets-Sheet 1

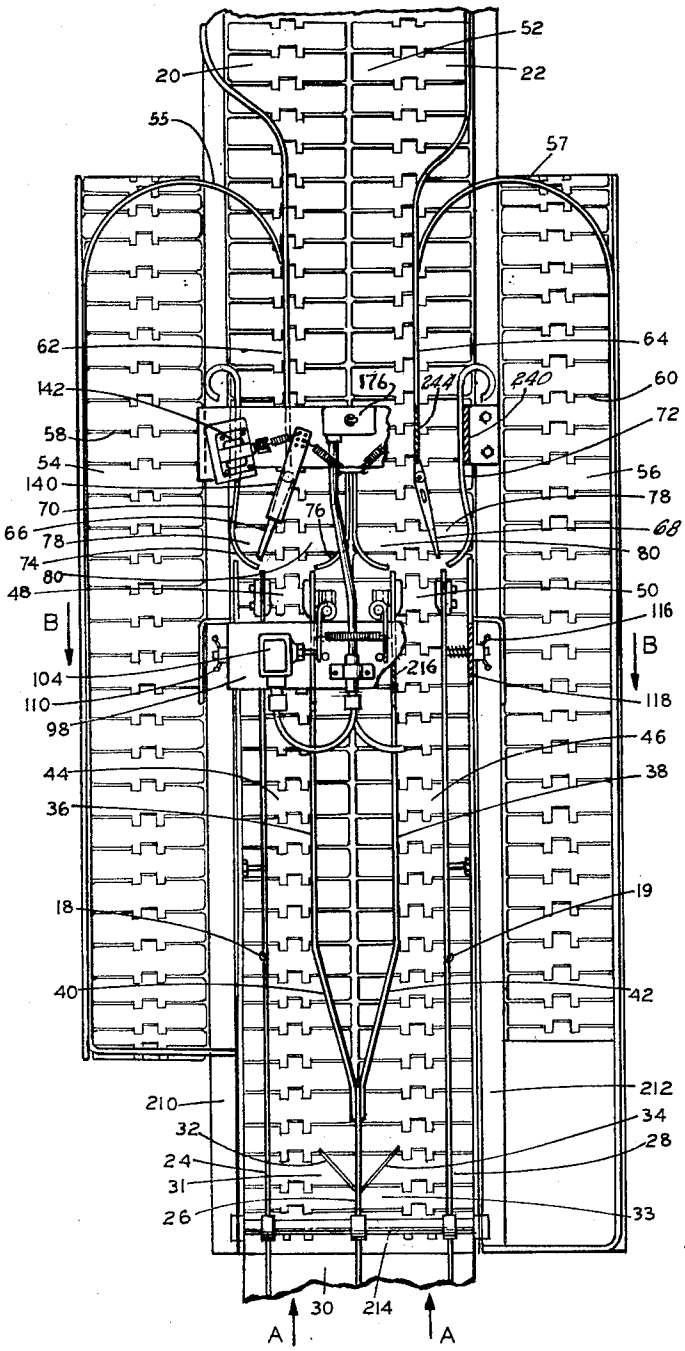


FIG.-1

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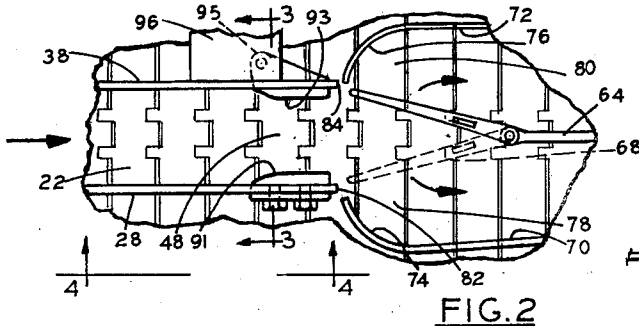


FIG. 2

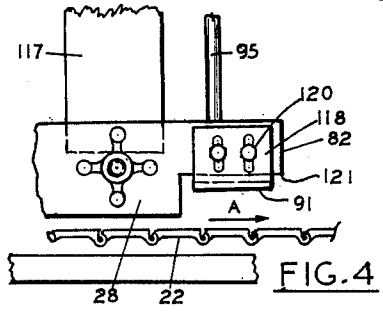


FIG. 4

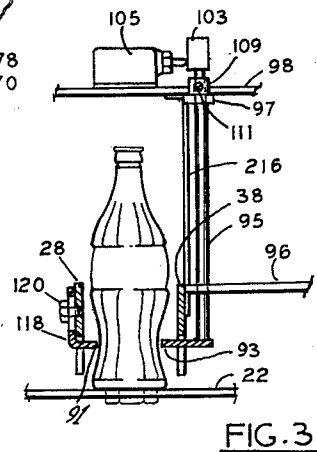


FIG. 3

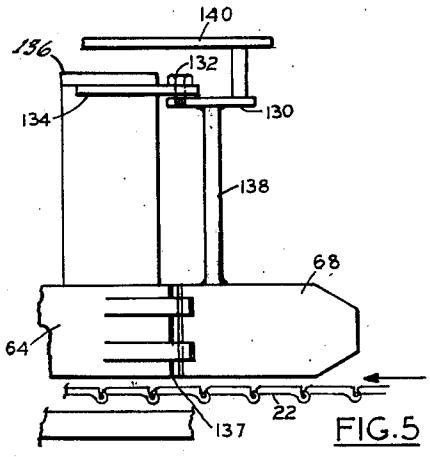


FIG. 5

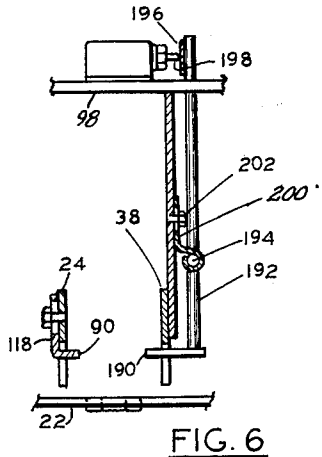


FIG. 6

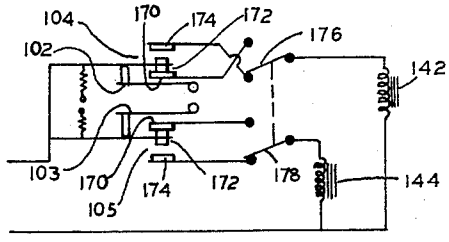


FIG. 7

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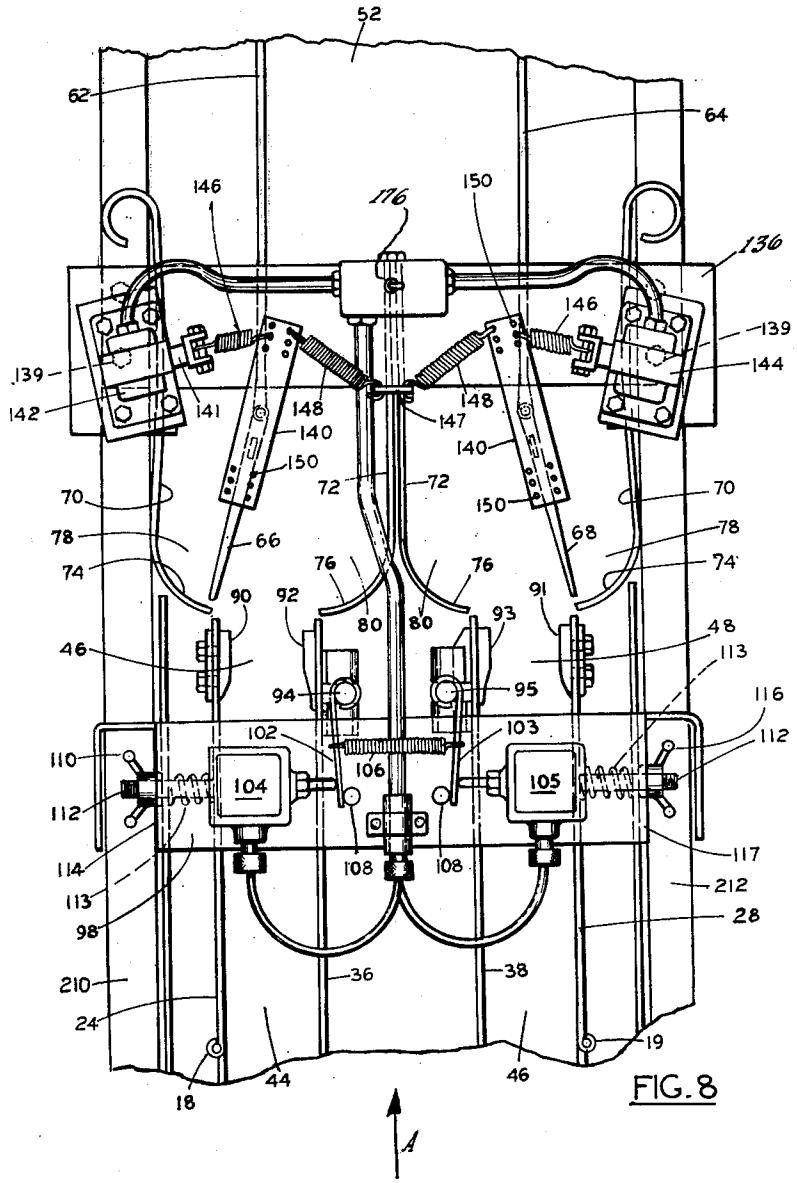


FIG. 8

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3,156,360

BEVERAGE BOTTLE SORTERS

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Filed June 9, 1960, Ser. No. 35,052
2 Claims. (Cl. 209—74)

This invention relates to bottle sorter apparatus and more particularly to apparatus for selecting a predetermined size of beverage bottle from an assortment of beverage bottles of varying sizes.

The invention is directed to a conveyor apparatus adapted to receive beverage bottles disposed of assorted sizes four abreast, and to select from the assorted sizes a single size and deliver such selected bottles for subsequent treatment such as washing, sterilization and re-filling, while delivering the bottles of sizes different from those selected to receiving areas for such disposition as may be desired.

The various features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

FIGURE 1 is a plan view of the bottle selecting apparatus with parts broken away.

FIGURE 2 is an enlarged fragmentary plan view of the selector sensing device, with parts broken away.

FIGURE 3 is a transverse sectional fragmentary view taken substantially on the line 3—3 of FIGURE 2.

FIGURE 4 is a fragmentary side elevational view taken from the line 4—4 of FIGURE 2.

FIGURE 5 is a fragmentary side elevational view of a gate.

FIGURE 6 is an alternate form of a sensing device.

FIGURE 7 is a circuit diagram; and

FIGURE 8 is an enlarged plan view of the sensing, and gate actuators.

Referring to the drawings, in FIGURE 1 there is shown link conveyors 20 and 22, adapted to move in the direction of arrows AA to advance miscellaneous bottles disposed upright thereon. The conveyors 20 and 22 are duplicated, to receive bottles four abreast as received in standard cases containing 24 bottles, and both conveyors advance bottles in the same manner and operate at the same speed.

Above the left hand conveyor 20 are spaced guide rails 24 and 26, the latter being located in the center and acting with a guide rail 28 to guide bottles moving on the right hand conveyor 22. The spacing between the guide rails 24 and 26, and 26 and 28 at the entrance end 30 is sufficient to permit bottles to move two abreast over each conveyor, so that bottles four abreast, as emptied from cases holding 24 bottles may be received. In order to cause bottles approaching two abreast to be arranged in single file, resilient leaf springs 32 and 34 mounted on the center rail 26 extend diagonally at about 45 degrees, about half-way across the path of the left and right hand conveyors 20 and 22. The leaf springs engage the sides

of the bottles about two inches above the conveyor. The bottles tend to approach the flat leaf spring at up to double the rate by reason of the conveyor speed, but are retarded by the springs 32 and 34, so that the bottles leave in single file at full conveyor speed. Consequently the conveyor moves faster than the bottles brought into the areas 31 and 33 partially confined by the springs 32 and 34. The springs yieldingly retard the bottles engaged thereby while the bottles against the outer rails 24 and 28 proceed, whereupon a bottle yieldingly retarded moves diagonally into line behind a bottle passing on along the rails 24 and 28, and ahead of the next bottle being advanced along the rails 24 and 28. The advancing of the conveyor, at a rate faster than the bottles during this operation, results in frictional sliding engagement between the conveyor and the bottle bottoms, to bring about the single file arrangement. Guide rails 36 and 38, having inclined portions 40 and 42, provide a path way for bottles advancing single file along the advancing conveyors in the areas indicated at 44 and 46. Since the bottles are arranged in single file and abut one another, all bottles are frictionally propelled forward by the conveyor at conveyor speed. The most forward bottle is propelled by the line of bottles behind it, with the combined driving force of the conveyor derived by the weight of the line of bottles.

The two single files of bottles on conveyors 20 and 22 pass one by one through the bottle selector regions indicated at 48 and 50, where one size of bottle is selected to pass down the conveyors 20 and 22 to the region 52 and toward the bottle washing apparatus (not shown), while the bottles of other sizes are delivered to the collecting areas 54 and 56, each of which have conveyors 58 and 60 moving in the direction of arrows B.

Guide rails 62 and 64 define the path of travel to the region 52, or the collecting areas 54 and 56. Each of the guide rails 62 and 64 are centered midway between the respective guide rails 36 and 24 and guide rails 38 and 28. Each of the guide rails 62 and 64 is provided at their leading ends with a hinged gate or deflector as at 66 and 68. Each gate is of a length to extend almost to the ends of the rails 24 and 36, and 28 and 38, respectively, and each is adapted to swing from the position indicated in FIGURE 1, where their tip ends are shown adjacent the ends of rails 24 and 28 respectively, to a similar position in respect to the ends of rails 36 and 38 respectively. The gate 66 is independent of the gate 68. With the gate 66 in the position shown, a bottle propelled into the gate from the selection area 48 will advance towards the area 52. If the gate 66 is swung to the opposite position the bottle will be propelled into the area 54, following forward movement by the conveyor 20 into the curved guide rail 55, after which the conveyor 58 takes over. Similarly if gate 68 be swung to the position opposite to that shown, bottles will be propelled against the curved rail 57, after which conveyor 60 takes over.

Laterally disposed on either side of each gate are guide rails 70 and 72, having curved ends 74 and 76 to provide pocket areas 78 and 80 wide enough to receive a bottle when the gate is angularly disposed on the side toward such pockets, that is for example when the gate 66 is in the position shown, the pocket area 78 is sufficient to accommodate a bottle. Thus for example if a bottle is moved toward the area 80, while the gate 66 is in the position shown, and the succeeding bottle is one that is

to be advanced oppositely to the area 78, the gate 66 may swing to the right, by moving the bottle into the pocket area 80, the pocket area being deep enough to allow the gate to swing to the right. Thus the succeeding bottle is advanced toward the area 78. If the next succeeding bottle is to be moved toward the region 52, the gate immediately is swung back to the position shown in FIGURE 1, moving the previous bottle into the clearance or pocket area 78. It will be appreciated that while the foregoing takes place, the bottles are being continuously advanced by the conveyors 20 and 22.

In order to select a particular bottle size, the line of bottles moving down the channels 44 and 46, one by one enter the selector regions 48 and 50. Since both selectors are identical, except for one being right handed and the other left handed, a description of one will suffice.

In FIGURE 2, the rails 28 and 38 are shown terminating as at 82 and 84 with the gate 68 immediately adjacent thereto with its leading edge swinging on an arc just beyond the ends 82 and 84 of the rails 28 and 38. Also there is shown the curved ends 74 and 76 of the guide rails 70 and 72, providing the pocket areas 78 and 80.

Each selector region 48 and 50 is provided with a gauging flange such as 90 and 91 affixed to the guide rails 24 and 28, respectively. The flanges 90 and 91, coact with cams 92, and 93 associated with the guide rails 36 and 38, which cams lie in the same plane with the flanges 90 and 91. Each cam 92 and 93 is mounted on vertical shafts 94 and 95 respectively. The shafts 94 and 95 are journalled in a plate 96 mounted on the upper edge of the guide rails 36 and 38. Each shaft is journalled adjacent its upper end in brackets as at 97 affixed to a bridge 98 extending across the conveyors at a height to clear the bottles passing along the conveyors. Each shaft 94 and 95 at its upper end is provided with arms 102 and 103 respectively. A common spring 106 normally holds said arms against stops 108. The arms 102 and 103, are adapted to actuate micro switches 104 and 105 mounted on the bridge 98, in response to bottles engaging and rocking cams 92 or 93 respectively.

A hand wheel 110, threaded on a stud 112 attached to the outer guide 24, which extends through the upright 114 of the bridge 98, and is adapted to vary the spacing between the flange 90 and the cam 92, by swinging the end of the guide rail 24, on its hinge 18, toward or away from the guide rail 36 and against a coil spring 113. A similar adjusting device indicated at 116 in bridge upright 117 is provided for the guide rail 28, the end of which is pivoted as at 19.

The gauge flanges 90 and 91 are each formed along the lower edge of a plate such as 118 each of which is secured to the end of the guide rails 24 and 28 respectively by threaded fastening means 120 extending through slots 122, so that the flanges may be raised or lowered. The guide rails 24 and 28 are cut away as at 121 to permit such adjustment. The cam shafts 94 and 95 are rigidly secured in the wide arms 102 and 103. Collars 109 having set screws 111 support shafts 94 and 95. By raising or lowering shafts 94 and 95, by shifting the collars 109, the cams 92 and 93 may be raised or lowered so as to lie in the plane of the gauge flanges 90 and 91. When a bottle of a diameter larger than the spacing between the gauge 90 and the cam 92, or the gauge 91 and cam 93 passes, the corresponding micro switch 104, or 105 is tripped and actuation of the gate 66 or 68 is effected.

For this purpose, each gate is provided with an actuating solenoid arranged in circuit with its respective micro switch.

Above each gate, there is provided an arm 130, pivoted as at 132 on a bracket 134 affixed to the bridge 136, the pivot being in alignment with the respective gate hinge such as 137 and, each arm is rigidly connected to its respective gate by a torsion bar 138. Disposed above and affixed to the arm 130 is lever arm 140, the ends of which extend equal distances beyond the pivotal center of the hinge and arm pivot 132. Solenoids 142 and 144 are mounted on the bridge 136, one for each gate. Each solenoid may be angularly adjusted on a pivot bolt such as 139, so as to align its armature 141 with either end of the lever arm 140. A spring 146 connects the lever arm with the armature. Return springs 148 connect each lever arm with a center bridge supported bracket 147. A series of apertures 150 in the opposite ends of each arm permits varying the location of the connection of the springs 146 and 148 to vary the effectual arm length. With the solenoid armatures connected to the ends of the arms as shown, the gates are yieldingly held in the positions shown by the springs 146 and 148 when the solenoids are de-energized. When either solenoid is energized, the gate is moved to the opposite position.

Referring to the circuit of FIGURE 7, it will be seen that each micro switch 104 and 105 has a normally closed circuit connection established by contacts 170 and 172, which may be opened by activation of the gauge cam 92 or 93, and respective arms 102 and 103, and a normally open circuit connection which may be closed through 172 and 174, upon activation of cams 92 or 93 and arms 102 and 103. A double pole double throw switch having blades 176 and 178 determines which set of contacts are to be employed. The switch blades 176 and 178 are shown in the normally open circuit position, and the apparatus is set to deliver to the area 52, all bottles of a diameter such that they pass by cams 92 or 93 without activation thereof. All bottles of larger diameter, close contacts 172 or 174 and cause the respective gate to swing, whereby each such bottle is caused to be moved into the collection regions 54 or 56.

If it be desired to select bottles of a certain diameter larger than the remainder, the guide rails are adjusted by the hand wheels to widen the space between the gauge flanges 90 and 91, and the cams 92 and 93 so that only the large diameter bottles of specific size actuate the micro-switches, all other bottles of smaller size passing on without actuating the cams 92 and 93. For this purpose, the switches are shifted to employ the closed circuit contacts 170 and 172, so that as each such large size bottle opens such circuit, the respective solenoid is de-energized moving either gate to the positions shown in FIGURE 8, whereupon each such bottle passes on to the region 52, and all others, which do not actuate the cams 92 and 93 to open contacts 170 and 172, are caused to move into the collection regions 54 and 56.

If it can be determined when selecting only the large size bottles that the larger proportion of bottles will be sent to the collection areas 54 and 56, the circuit just described will be closed for a greater time than it will be open. To reduce the current consumption under these conditions, the open circuit contacts 172 and 174 of the micro-switches may be employed, if the solenoids 142 and 144 are swung on their pivots 139 and their armatures and springs 146 are connected to the opposite ends of the arms 140, the springs 148 also being shifted.

Many bottles of varying capacity have the same size bottoms, but by reason of being of hourglass or other fanciful shape, vary in diameter at some distance above the bottom. By raising or lowering the gauge flanges 90 and 91 and the cams 92 and 93, the variations in bottle shape may be used for selection purposes. The apparatus selects either the largest size, or the smallest size, rejecting the other sizes. If the bottles are in three sizes, the apparatus may be duplicated to sort the larger or smaller of the two sizes separated from the previously selected size. Thus after selection of one size, the remaining bottles of two diameters may be delivered to a second apparatus set to select one size of the remaining bottles and if there are bottles of four sizes, a third apparatus may be used to select one of the remaining sizes from the two sizes remaining after passing through the second apparatus.

It will be understood however that as a bottle reaches either sensing cam **92** or **93**, the gate shifts immediately in response to any bottle actuating the cam and calling for such shift, and the gate shifts immediately just before the bottle enters the area swept by the free end of the gate. As the next bottle moves into the sensing area, the prior bottle is well started into the pocket area **78** or **80** and if the next bottle requires a shift of the gate, the previous bottle is moved into the pocket as it is carried forward by the conveyor. If a sequence of bottles of the same size pass for example to the right without shifting of the gate, the bottles will pass on without being deflected into the pocket areas, such areas being provided for the purpose of providing an area into which a bottle may be moved to permit the gate to shift in response to a bottle of different size which must pass to the left.

In FIGURE 6, a modified sensing device is shown wherein the bottle actuated cam **190** is affixed to a vertical lever **192**, pivoted as at **194** on a horizontal axis. The upper end of the arm has a pad **196** adapted to engage and operate the micro-switch plunger **198**, when a bottle of greater diameter than the spacing between the flange **91** and the cam **190** passes there between. The pivot bracket **200** is slotted to receive a bolt **202**, whereby the cam **190** may be raised or lowered.

The dual apparatus, that is conveyors **20** and **22** are operated at speeds such as to receive bottles at a rate up to 600 per minute, half of such number travelling on conveyor **20**, and the remainder on conveyor **22**. A standard bottle cleansing apparatus is capable of operating at 250 bottles per minute. The assortment of bottles received generally contains 50% or less of the bottle size to be selected and sent on for washing, sterilization and cleansing, so it can be seen that the output of the sorting apparatus is comparable to that necessary to keep subsequent apparatus in supply of bottles of the one size selected.

While conveyors **20** and **22** have been referred to as separate, both operate in unison, and may be one conveyor. The conveyors are supported on a frame as is well understood in the art, such frame being indicated by lengthwise side members indicated at **210** and **212**. The guide rails **24** and **28**, at their adjustable ends may be in part supported from the adjustment screws **110**, and at their other ends from a bridge such as **214** having uprights extending upward from the frame members **210** and **212**. The guide rails **36** and **38** may be hung from the bridge **98** as by a member such as **216**, and supported at their other ends from the bridge **214**, the bridge being supported from the members **210** and **212** as by the uprights indicated at **114** and **117**.

The guide rails **70** may likewise be hung from the bridge **136**, which bridge is supported by side members such as **240** extending upwardly from the members **210** and **212**, similarly as in the case of the bridge **98**. The guide rails **62** and **64**, may also be supported from the bridge as by members such as **244**.

In practice the bottles selected may be caused to traverse the outer lanes, which may converge at some distant point, while the bottles rejected may proceed down the center to a central bottle case filler.

In the form shown, the bottles as they collect in the areas **54** and **56** are removed and placed in cases, manually or otherwise.

While a preferred embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

We claim:

1. A bottle sorting apparatus comprising a conveyor for moving circular bottles in upright position, a pair of guide rails disposed immediately above said conveyor extending in a direction of movement of said conveyor, said guide rails forming a guide way for single file movement of bottles therebetween, and terminating immediately beyond a bottle diameter sensing region, movable cam means disposed above said conveyor at guide rail height on one side of said sensing region, and being moved by the passage of the body portion of bottles exceeding a predetermined diameter at the height of said cam means, a center guide rail disposed above said conveyor beyond said sensing region, having the end nearest said sensing region disposed substantially on a center line between said pair of guide rails; a gate of a radial length substantially greater than the circular bottles to be sorted pivoted at the said end of said center guide rail and extending toward the ends of said pair of guide rails, and having its free end swing through an arc between the ends of said pair of rails, means for biasing said gate to a position with its free end adjacent the end of one of said pair of rails, means for swinging the free end of said gate to a position adjacent the end of the other of said pair of rails in response to movement of said cam means, and guide rails disposed on either side of said center rail in spaced relation to provide two paths for bottles to move on opposite sides of said center rail, said last named guide rails having curved pocket forming portions on opposite sides of the free end of said gate, the pockets formed by the pocket forming portions of said last named guide rails being of a sufficient width immediately adjacent the end of said guide way means and in advance of said gate hinge to accommodate a bottle when the gate is swung to its end limit position adjacent the pocket, whereby the gate may move a bottle into the pocket for delivery to one pathway in order to receive an immediately succeeding bottle for delivery into the other pathway said curved portions terminating adjacent the respective ends of said pair of rails.

2. A circular bottle sorting apparatus, a conveyor, a pair of guide rails extending in the direction of movement of said conveyor and disposed immediately above said conveyor at one end thereof and spaced apart to accommodate upright circular bottles on said conveyor disposed two abreast, a leaf spring secured to one of said guide rails, extending diagonally across said conveyor in the direction of movement of said conveyor and terminating approximately midway between said rails to cause bottles to arrange themselves in single file, a pair of guide rails disposed immediately above said conveyor beyond said leaf spring and extending in the direction of movement of said conveyor, said guide rails forming a guide way for single file movement of circular bottles therebetween, and terminating immediately beyond a bottle diameter sensing region, movable cam means disposed above said conveyor at guide rail height on one side of said sensing region, and being moved by the passage of the body portion of bottles exceeding a predetermined diameter at the height of said cam means, a center guide rail disposed above said conveyor beyond said sensing region, having the end nearest said sensing region disposed substantially on a center line between said pair of guide rails; a gate of a length greater than the overall diameter of the bottles to be sorted pivoted at the said end of said center guide rail and extending toward the ends of said pair of guide rails, and having its free end swing through an arc between the ends of said pair of rails, means for biasing said gate to a position with its free end adjacent the end of one of said pair of rails, means for swinging the free end of said gate to a position adjacent the end of the other of said pair of rails in response to movement of said cam means, and guide rails disposed on either side of said center rail in spaced relation to provide two paths for bottles to move on opposite sides of said center rail, said last named guide rails having curved pocket forming portions on opposite sides of the free end of said gate, the pockets formed by the pocket form-

ing portions of said last named guide rails being of a sufficient width immediately adjacent the end of said guide way means and in advance of said gate hinge to accommodate a bottle when the gate is swung to its end limit position adjacent the pocket, whereby the gate may move a bottle into the pocket for delivery to one pathway in order to receive an immediately succeeding bottle for delivery into the other pathway said curved portions terminating adjacent the respective ends of said pair of rails and providing space to receive a bottle without interfering with the swing of said gate.

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