Sept. 9, 1952 W. HARTIG ET AL 2,609,926

BOTTLE SORTING MACHINE

Filed July 21, 1948 4 Sheets-Sheet 1

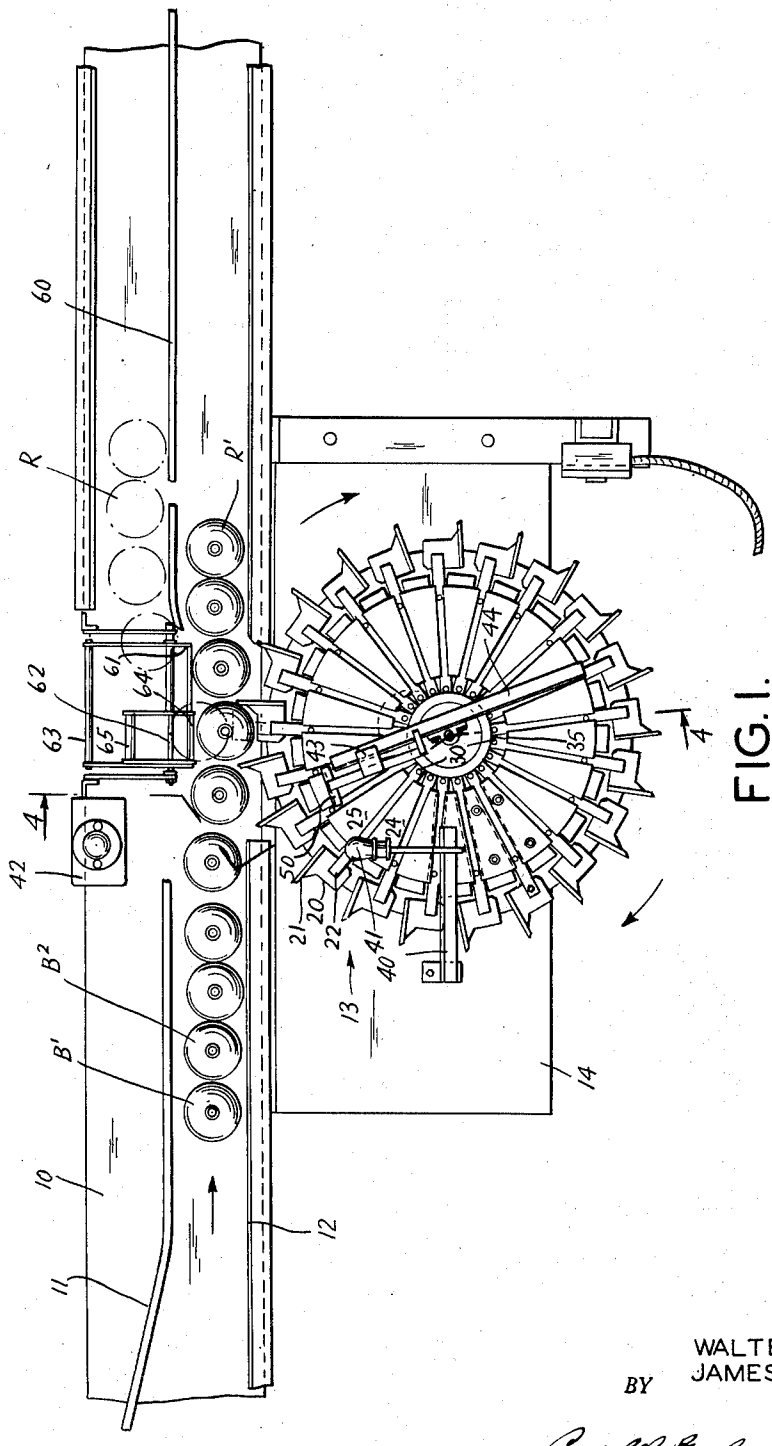


FIG. I.

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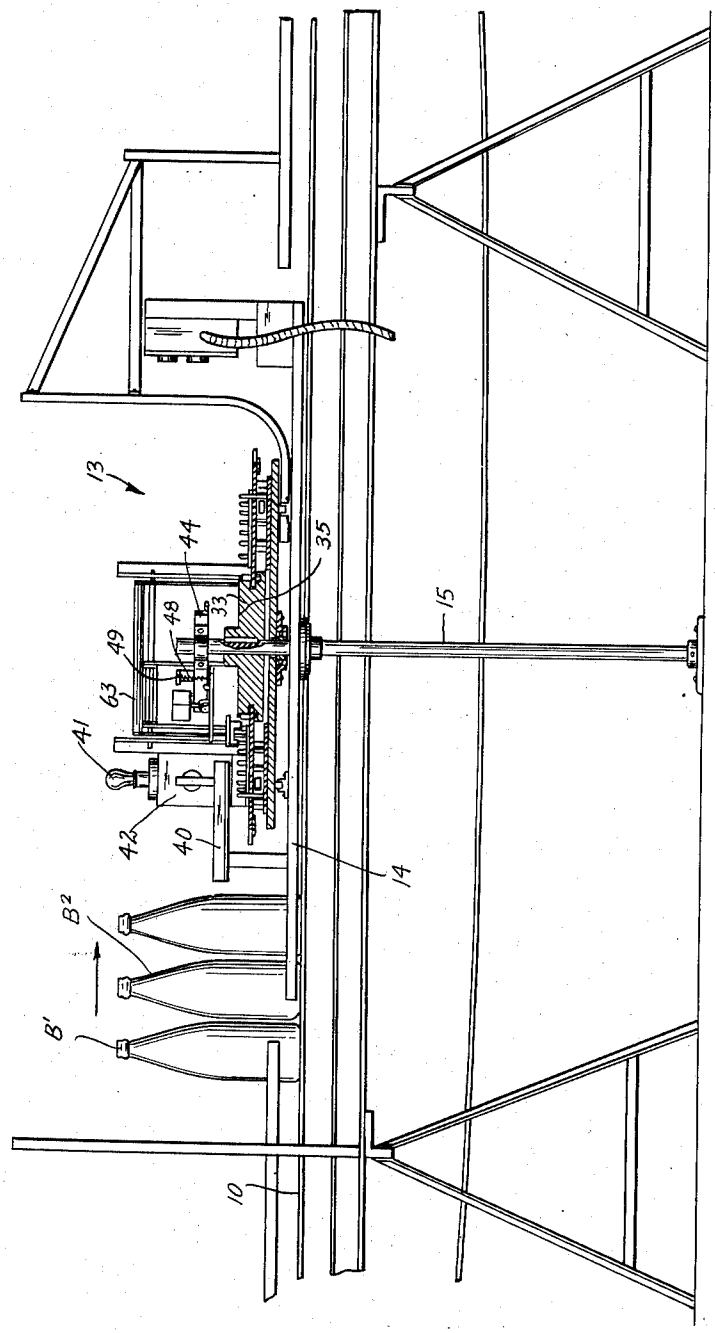
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Sept. 9, 1952 W. HARTIG ET AL 2,609,926

BOTTLE SORTING MACHINE

Filed July 21, 1948 4 Sheets-Sheet 2

FIG.2.



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BOTTLE SORTING MACHINE

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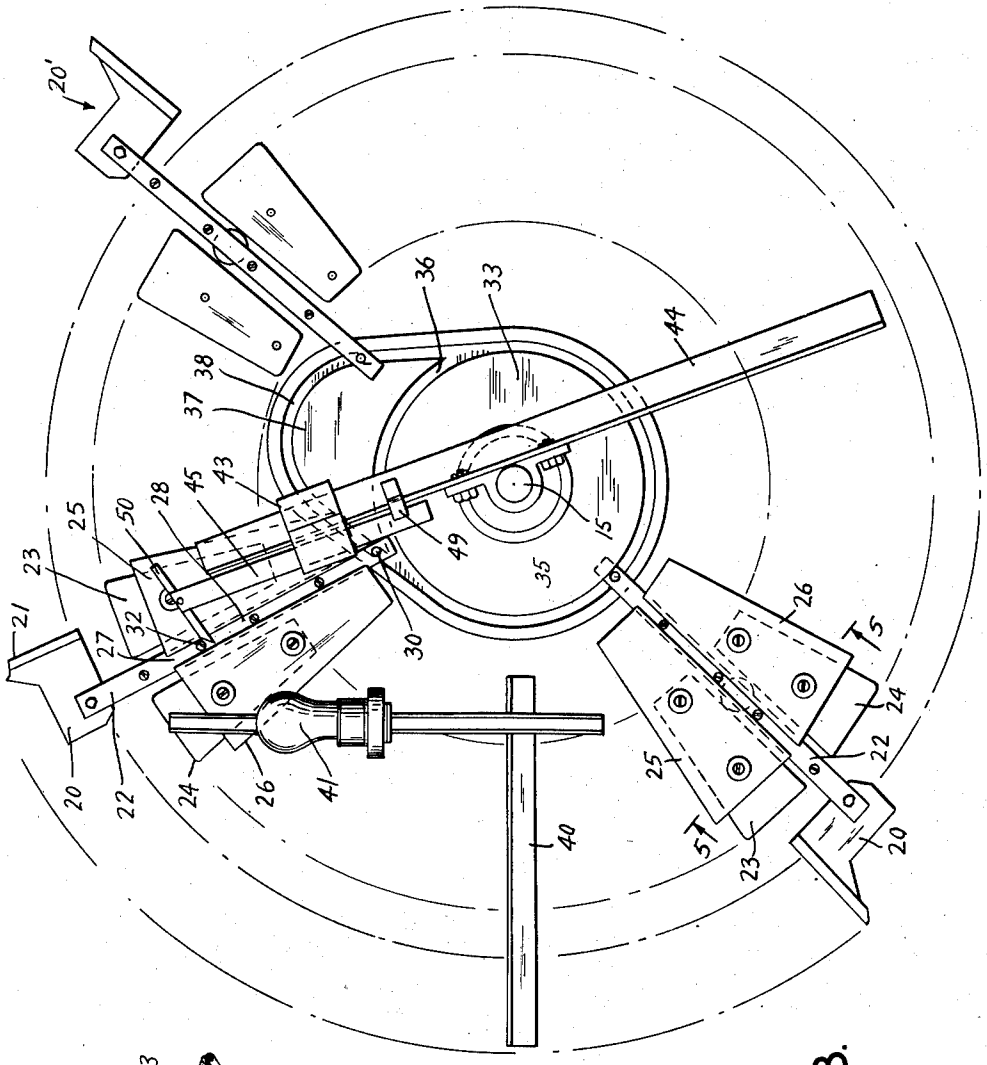


FIG.3.

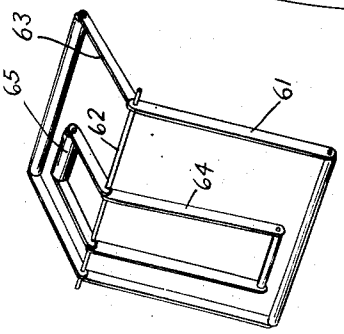


FIG.8.

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BOTTLE SORTING MACHINE

Filed July 21, 1948 4 Sheets-Sheet 4

FIG. 4.

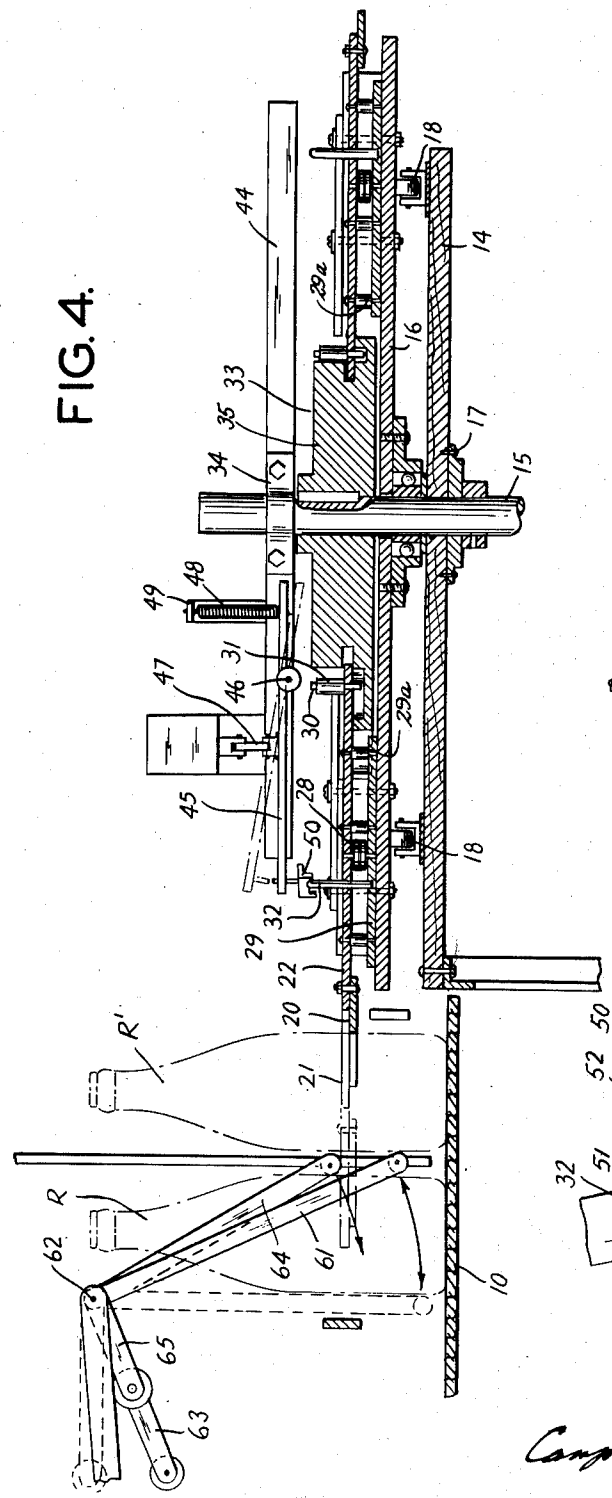


FIG. 5.

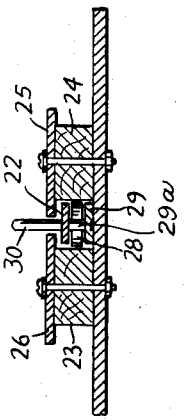


FIG. 6.

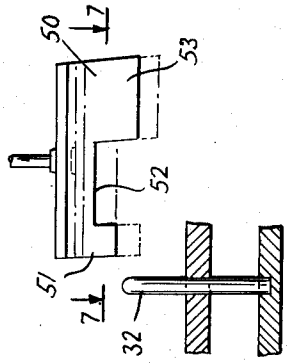
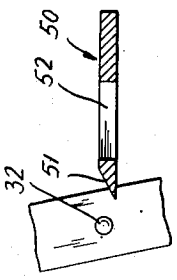


FIG. 7.



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Patented Sept. 9, 1952

2,609,926

UNITED STATES PATENT OFFICE

2,609,926

BOTTLE SORTING MACHINE

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Application July 21, 1948, Serial No. 39,944

10 Claims. (Cl. 209—74)

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This invention relates to devices for sorting bottles and it relates particularly to a device for sorting or separating bottles of one color from bottles of another color.

An object of the invention is to provide a simplified form of device for sorting bottles which is operative automatically to separate bottles of different colors into different groups.

Another object of the invention is to provide a simplified form of device which is capable of detecting and separating bottles of one color from bottles of another color without the use of power actuated mechanism for operating the bottle sorting device.

A further object of the invention is to provide a bottle sorting device which is operative by movement of the bottles themselves.

In accordance with the present invention, we have provided a sorting mechanism which is actuated by movement of a row of bottles on a conveyor and which is responsive to the difference in transparency or color of bottles to separate the row of bottles into two rows each of which contains bottles of only one color or degree of transparency.

More particularly, the invention includes a turntable mechanism provided with a plurality of pusher members which are successively disposed in the path of movement of a row of bottles advanced by means of a conveyor, the pusher members being controlled by suitable cam tracks having different shapes, whereby bottles of one color are permitted to advance in substantially a straight line past the sorting device and bottles of another color are pushed laterally into a second column by movement of the pusher members.

The bottles are classified by means of a photoelectric cell or other light-sensitive device positioned so that a beam of light impinging upon the cell is intercepted by the row of bottles passing therealong. If the bottle is relatively transparent or clear, uncolored glass, the pusher member engaging or engaged by the bottle is caused to follow one cam path. If, however, the bottle is of less transparency or is of a different color, for example, brown or green, the response of the photoelectric cell is utilized to cause the pusher member to follow a different cam path and thereby cause the colored bottles to be disposed in a different row on the conveyor than the uncolored or transparent bottles.

Motion is imparted to the pushers by movement of a conveyor which supports and moves the bottles so that the sorting device does not require a separate motor or other power means for its operation.

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The above-described mechanism is substantially automatic in operation, is simple to install and operate and is highly efficient classifying and sorting bottles or other transparent articles.

For a better understanding of the present invention, reference may be had to the accompanying drawing, in which:

Fig. 1 is a plan view of a typical form of sorting device embodying the present invention with the bottle conveying mechanism broken away to disclose only a portion of it;

Fig. 2 is a view in side elevation of a typical form of device embodying the invention with the sorting head or turntable shown partially in vertical section;

Fig. 3 is a plan view of the sorting head or turntable shown with parts removed and partly broken away to disclose details of construction;

Fig. 4 is a view in section taken on line 4—4 of Fig. 1;

Fig. 5 is a view in section taken on line 5—5 of Fig. 3;

Fig. 6 is a view partially in section and partially broken away of the deflector member of the device for selecting the proper cam track for the pusher member;

Fig. 7 is a view in section taken on line 7—7 of Fig. 6; and

Fig. 8 is a perspective view of a guiding member for the device.

The form of the invention disclosed in the drawings will be described hereinafter with reference to the sorting of bottles to separate bottles of different colors into differen groups. For ease of explanation, the bottles will be referred to as clear bottles and green bottles, although it will be understood that the device is equally useful for separating green bottles from brown bottles or transparent or clear bottles from bottles of various other colors. Also the device is useful for sorting other translucent or transparent articles.

Ordinarily, the differently colored bottles traveling from a washing device are mixed at random. Inasmuch as different beverages are packed in different colored bottles, it is necessary to sort these bottles into different groups.

In accordance with the present invention, a series of clear bottles B^1 and colored bottles B^2 are delivered at random onto a conveyor 10 and are advanced in a row by the conveyor. The bottles are guided by means of a suitable deflector plate 11 and side rail 12 located above the conveyor belt 10. The conveyor 10 may be of the endless belt type although any other suitable type of conveyor can be used with equal facility.

The row of bottles B^1 and B^2 is advanced past a sorting mechanism 13 of the type embodying the present invention. The sorting mechanism 13 may include a suitable platform 14 or table disposed adjacent the conveyor belt 10. This table may be mounted on suitable legs, or, as shown in Fig. 2, upon a fixed standard 15 which is bolted or otherwise secured to the floor. The standard supports a rotatable turntable 16 of disc-like shape which is mounted for easy rotation on the standard 15 by means of a suitable bearing 17, as shown in Fig. 4. The table 14 may also be provided with a series of rollers 18 which engage and prevent tilting of the turntable 16.

The turntable 16 is provided with a plurality of pushers all of which are similar in construction and only one of which will be described herein. The pusher includes a plate-like member 20 having a forwardly projecting end portion 21 which overlies the conveyor 10 during a part of the rotary movement of the turntable 16 and is adapted to be engaged by a bottle moving along the conveyor 10. As the bottle advances, it will strike the projecting end 21 and tend to cause the turntable 16 to rotate in a clockwise direction, as viewed in Fig. 1. The plate member 20 is supported on the end of a bar or push rod 22, best shown in Fig. 3, which is slidably mounted between a pair of inwardly tapering spacer blocks 23 and 24. These blocks are secured to the turntable 16 by means of bolts, rivets or any other suitable way. Overlying the lateral edges of the bar are a pair of tapered retaining plates 25 and 26 which are secured to the upper surfaces of the spacers 23 and 24 and define between them a slot 27 which is narrower than the width of the pusher bar 22. The pusher bar 22 is partially guided for reciprocation in the space between the spacers 23 and 24 by means of an antifriction roller 28 which is supported for rotation between the bar 22 and a lower supporting bar 29 which slides on the turntable and supports the bar 22 by means of suitable spacers 29a as best shown in Figs. 4 and 5. The upper bar 22 is provided at its inner end with a pin 30 which extends below and above the bar 22. The pin 30 may be provided with a suitable roller or rotary sleeve 31 for a purpose described hereinafter.

Near the outer end of the bar 22 is a second upwardly extending pin 32 which is supported in a vertical position by the upper and lower bars 22 and 29.

The lower end of the inner pin 30 cooperates with a cam member 33 which is best shown in Figs. 3 and 4. The cam member 33 is fixed to the standard 15 by means of a key 34 so that the cam is retained against rotation. The cam 33 is provided with a disc-like mid-portion 35 which is defined by means of a cam groove 36 of circular or annular shape. The cam member 33 also has a laterally extending lobe portion 37 which is provided with a cam groove or track 38 following generally the contour of the lobe. The cam track 38 is joined at its opposite ends to the cam track 36.

The pin 30 is adapted to follow either the cam track 36 or the cam track 38 and the track to be followed is selected by the following mechanism.

Mounted above the turntable and pusher elements and supported on a bracket 40 carried by the table 14 is an electric light bulb 41 for projecting a beam of light onto a photoelectric cell, not shown, mounted in a housing or casing 42 on the opposite side of the conveyor 10 from the turntable or sorting mechanism 13. The light bulb and the photoelectric cell are so located that the bottles advanced by the conveyor 10 intercept the light beam. The photoelectric cell is connected through a suitable amplifier and switching means to a solenoid 43. The solenoid is carried on an arm 44 which is fixed to the upper end of the standard 15 and is inclined at an acute angle to the direction of movement of the conveyor belt 10. The arm 44 is inclined at about a 70° angle in a direction opposite the movement of the conveyor so that it substantially overlies the place where the left hand end of the cam track 38 joins the cam track 36. The arm 44 supports a lever 45 by means of a pivot 46 so that the outer end of the lever 45 can move up and down. The armature of the solenoid is connected to the lever 45 by means of a suitable link 47, as shown in Fig. 4 so that when the solenoid is energized, the outer end of the lever 45 is raised. The outer end of the lever 45 may be moved downwardly by means of a spring 48 connected between a bracket 49 on the arm 44 and the inner end of the lever 45.

The outer end of the lever 45 is provided with a deflecting member 50 which, as shown in Fig. 3, is inclined to the axis of the arm 45. As best shown in Figs. 6 and 7, the inner end of the member 50 is provided with a bevel 51 and the lower edge of the member 50 is provided with a notch 52. The leading or inner end 51 of the member 50 is somewhat narrower vertically than the trailing edge 52.

The deflector member 50 cooperates with the pin 32 carried near the mid-portion of the push rod 22 to cause the inner pin 30 either to follow the circular cam track or the elliptical portion of the cam track 38. Assume that the device is adjusted so that when a clear or more transparent bottle passes between the source of light 41 and the photoelectric cell, the solenoid 43 will not be energized and when a green bottle passes the solenoid 43 will be energized. Under these conditions, as a clear bottle B^1 intercepts the beam of light, it will be about to engage one of the pusher members 20. Inasmuch as the solenoid 43 is not energized, the deflector member 50 will be in the path of the pin 32 carried by that pusher member. As the turntable is rotated by movement of the bottles the pin 32 engages the bevel 51 on the deflector 50, and the bar 22 will be pushed outwardly in a radial direction. The angular relationship of this pusher bar is such with respect to the cam tracks 36 and 38 that the inner pin 30 will be moved outwardly into the cam track 38. As the conveyor 10 advances, the bottles thereon engage the various pushers so that the turntable 16 is rotated clockwise. During clockwise movement of the turntable 16, the pin 30 travels along the cam track 38 and projects the pusher member 20 against which the transparent bottle B^1 bears. Inasmuch as the pusher member 20 moves radially outward, the transparent bottle will be displaced transversely of the conveyor 10 and will be disposed in a row R, best shown in Fig. 1.

If, on the other hand, a green bottle intercepts the light beam, this will cause energization of the solenoid 43 with the result that the pusher member 50 is raised upwardly so that the pin on the pusher member engaging the green bottle will pass under the bevelled end 51 of the deflector 50, as shown in full lines in Fig. 6 and through the notch 52. As a result, the inner pin 30 on that pusher member will follow around the circular cam track 36 and that pusher mem-

ber will not be displaced radially. During this movement the roller 31 on the pin 30 will roll around the disc-portion 35 of the cam 33 with little friction. Accordingly, the green bottles will not be displaced laterally to any substantial degree and will form a second row R^1 on the conveyor 10, as shown in Fig. 1.

In order to make certain that these bottles will not again become mixed, the device may be provided with a dividing rail 60 extending lengthwise of the conveyor belt. Also, to prevent tilting or unwanted slipping movement of the bottles transversely of the conveyor belt, a gate device is provided for keeping the green bottles in line. This device is best shown in Figs. 1, 4 and 8. It includes a bail or U-shaped member 61 which is pivotally mounted on a shaft 62 supported above the conveyor belt 10. The bail 61 is connected to a rearwardly extending bail-like counterweight 63 which tends to swing the member 61 toward the sorting device 13. The lower bail 61 will not swing out a sufficient distance to prevent passage of the bottles but it will yieldingly resist lateral displacement of the bottles. A further retaining member is also provided which is of similar construction but includes a narrower bail member 64 and a narrow counterbalance member 65. This member is disposed near the left-hand edge of and within the bail member 61. The deflector arrangement described above has the function of preventing unwanted displacement of the bottles or stoppage of the sorting device 13 when bottles are supplied in rather widely spaced relation to the conveyor belt 10. If only one bottle is in engagement with the sorting device 13, little force is available to rotate the sorting device 13 and as a result, a single bottle might slip laterally past a pusher plate 20 or into the wrong row. Such improper sorting is prevented because the bottle is retained by the bail members 61 and 64 in contact with the pusher plate 20 and it cannot slide laterally past the end 21 of the pusher plate.

From the preceding description of a typical form of device embodying the invention, it will be clear that we have provided an automatic sorting device which is capable of quickly and efficiently separating bottles of different colors or transparency into separate groups. Due to the absence of power drive for the sorting device, it can be manufactured inexpensively and can be used very easily with substantially any type of conveyor system.

It will be understood that the device is susceptible to considerable modification and that it can be regulated to cause the colored bottles to be displaced transversely of the conveyor 10 while uncolored bottles are not displaced.

Also, the construction and mounting of the pusher arms and the design and size of the cams may be modified substantially as the purpose demands and without departing from the invention. Therefore, the form of the invention described herein should be considered as illustrative and not as limiting the scope of the following claims.

We claim:

1. A bottle sorting device comprising a freely rotatable turntable, a plurality of pushers mounted on said turntable for inward and outward movement, a conveyor for moving a row of bottles toward said turntable to engage said bottles with said pushers and rotate said turntable, first guide means for retaining said pushers

against outward movement, second guide means for moving said pushers outwardly as said turntable rotates, and means sensitive to the color of each bottle for selectively connecting said pushers with said guide means to permit bottles of one color to pass by said turntable without substantial displacement transversely of said conveyor, and to cause said pushers to move outwardly to displace bottles of another color transversely of said conveyor.

2. A bottle sorting device comprising a freely rotatable turntable, a plurality of pusher members mounted on said turntable for substantially radial movement relative to said turntable, a fixed substantially circular cam track, a fixed eccentric cam track joined at its ends to and extending outwardly from the circular track, follower means on said pushers engaging in said cam tracks, means for conveying bottles into engagement with said pusher members to rotate said turntable, and means responsive to bottles of different colors for selectively guiding the follower of a pusher member engaged by a bottle of one color into said eccentric track and allowing the follower member of a pusher member engaged by a bottle of a different color to move along the circular track.

3. A bottle sorting device comprising a freely rotatable turntable, a plurality of pusher members mounted on said turntable for substantially radial movement relative to said turntable, a fixed substantially circular cam track, a fixed eccentric cam track joined at its ends and extending outwardly from the circular track, follower means on said pushers engaging in said cam tracks, means for conveying bottles into engagement with said pusher members to rotate said turntable, a projection on each pusher member, a deflector member overlying said turntable, said deflector being movable into the paths of said projections to guide said followers into said eccentric cam track and out of the paths of said projections to permit said followers to follow said circular cam track, and means responsive to the colors of said bottles for moving said deflector into and out of said paths.

4. A bottle sorting device comprising a freely rotatable turntable, a fixed member concentric with said turntable having a substantially circular groove therein and an eccentric groove connected with said circular groove and extending outwardly beyond the latter, a plurality of bars mounted on said turntable for lengthwise movement substantially radially of said turntable, a follower member on each bar slidable selectively in said grooves, projections extending upwardly from said bars, a deflecting member overlying said turntable and movable toward said turntable to engage said projections as said turntable rotates, to guide the follower of a bar having a projection engaging said deflector into said eccentric groove, electrical means for moving said deflector toward and away from said turntable, means for conveying a row of bottles past said turntable, means on said bars engaged by said bottles for rotating said turntable, and light-sensitive means connected to said electrical means for moving said deflector away from said turntable and out of engagement with said projections.

5. A bottle sorting device comprising a freely rotatable turntable, means for conveying bottles past said turntable, a plurality of pushers mounted on said turntable for movement substantially radially of said turntable between in-

ner and outer positions, said pushers being disposed in the path of said bottles for engagement therewith to rotate said turntable, followers on said pushers, first guide means engageable with said followers to retain said pushers in said inner position, a second guide means engageable with said followers to move said pushers to said outer position and return them to said inner position as said turntable rotates, a deflecting member overlying and movable between upper and lower positions, a projection on each pusher for engagement with said deflecting member when the latter is in said lower position to direct the followers on the pushers into said second guide means as said turntable rotates, and means including a light-sensitive device for moving said deflector member in response to the color of the bottles engaging said pushers.

6. A bottle sorting device comprising a freely rotatable turntable, a plurality of pushers slidably mounted on said turntable for substantially radial movement, a follower on each pusher, a projection on each pusher, a deflector member overlying said turntable and movable into the path of said projection as said turntable rotates to move said pusher outwardly, a guide to receive the follower on an outwardly moved pusher and cause it to move outwardly and inwardly as said turntable rotates, a conveyor for moving a row of bottles into engagement with said pushers to rotate said turntable, and light-sensitive means connected with said deflector for moving the latter out of the path of said projection upon engagement of a bottle of a predetermined color with a pusher.

7. A bottle sorting device comprising a rotatable turntable having pushers thereon movable relative to and with said turntable, a conveyor to advance a row of bottles toward said turntable to engage said bottles with said pushers and rotate said turntable, light-sensitive means for discriminating between bottles of different colors, first means for retaining said pushers against movement relative to said turntable, second means actuated by rotation of said turntable for moving said pushers relative to said turntable as the latter rotates, and means connected with and controlled by said light-sensitive means for selectively connecting said pushers to one of said first and second means.

8. A bottle sorting device comprising a rotatable turntable having pushers thereon movable inwardly and outwardly relative to said turntable and rotatable with the latter, a conveyor to advance a row of bottles toward said turntable and engage said bottles with said pushers to rotate said turntable, light-sensitive means for detecting bottles of different colors, first means for retaining said pushers against inward and outward movement relative to said turntable, second means actuated by rotation of said turntable for moving said pushers outwardly from said turntable as the latter rotates, means connected with and controlled by said light-sensitive means for selectively connecting said pushers to one of said first and second means, and means adjacent to said conveyor for yieldingly resisting movement of said bottles transversely of said conveyor.

9. A bottle sorting device comprising a freely rotatable turntable having a plurality of pushers mounted thereon for inward and outward movement relative thereto, a conveyor adjacent to the edge of said turntable for rotation with said turntable and for moving a row of bottles of different colors into engagement with said pushers to rotate said turntable, first means actuated by rotation of said turntable for moving said pushers inwardly and outwardly, second means for retaining said pushers against inward and outward movement during rotation of said turntable, and means responsive to the color of a bottle moving into engagement with a pusher for selectively connecting the last-mentioned pusher with one of said first and second means.

10. A bottle sorting device comprising a rotatable turntable having a plurality of pushers mounted thereon for inward and outward movement and for rotation with said turntable, a conveyor adjacent to the edge of said turntable for moving a row of bottles of different colors toward said turntable to engage said bottles with said pushers and rotate said turntable, a first guide member adjacent to the inner ends of at least some of said pushers engageable with said pushers to move the latter in and out substantially transversely of said conveyor as said turntable rotates, a second guide member adjacent to the inner ends of said pushers and engageable therewith to retain said pushers against inward and outward movement during rotation of said turntable, and color sensitive means responsive to the color of a bottle in engagement with a pusher for selectively engaging the latter with one of first and second guide members.

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