

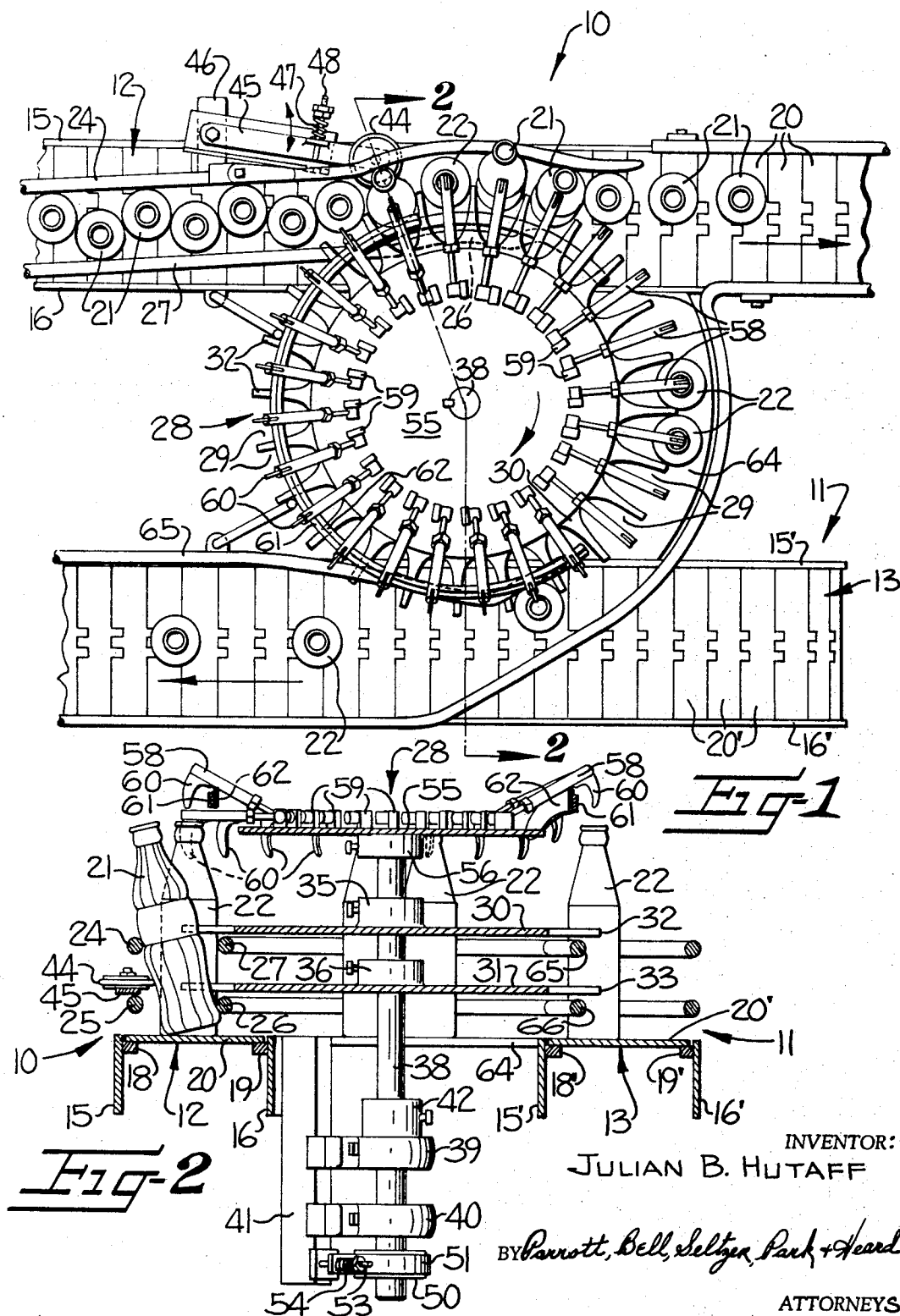
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BOTTLE SORTING APPARATUS

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3,409,128
BOTTLE SORTING APPARATUS
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ABSTRACT OF THE DISCLOSURE

An apparatus for sorting bottles of varying bottle configurations. Sorting results from the operation of a bottle conveying means which positions bottles of a selected configuration in a predetermined manner. Bottles having a given configuration are engaged by a retaining device, whereas other bottles of a different configuration are not engaged. The conveyor then causes the two groups to move in separate paths.

My invention relates to a bottle sorting apparatus and, more particularly, to an apparatus for sorting bottles of varying bottle configuration types into groups by configuration type.

Many bottling plants produce a variety of drinks which are distributed in bottles of similar height and general body diameter but of varying bottle configuration types. Where a bottling plant is using such bottles of varying configuration types, bottles are typically returned to the plant in random groups which are not sorted by configuration type. Inasmuch as the various configuration types of bottles normally will be filled with various drink products, it is necessary that the bottles be sorted by configuration type at some time before they are introduced into the filling and capping machines. In order to reduce the possibility of contamination of the bottle or the bottle contents which could result from intermediate handling, bottling plant operators would prefer that bottles received in groups of more than one configuration type be sorted prior to introduction of the bottles into a bottle washer and be thereafter conveyed directly from the washer to the filling and capping cycle.

Heretofore, sorting of bottles was widely done by hand, either before introduction of the bottles to the washer or as the bottles were conveyed from the washer to the filling and capping machines. While various bottle sorters have been previously available, they have not been satisfactory for this operation, primarily because none have been capable of sorting bottles of similar height and general body diameter but of various configuration types and secondarily because the complication of such bottle sorters as have been previously available has rendered them quite expensive, due to the use of electro-mechanical or optical selector systems and the necessity of providing independent drive arrangements. Bottling plant operators have found it economically more attractive to have such sorting done by hand.

Accordingly, it is a primary object of the present invention to provide a novel apparatus for sorting bottles which is readily adaptable for use with conventional bottling plant equipment, which does not require sophisticated drives and selector systems, and which is economically attractive to a bottling plant operator in terms of initial and maintenance costs, saving of manual labor, and increased efficiency in operation.

A more specific object of this invention is to provide an apparatus of the type described which is capable of sorting into groups by configuration types a plurality of bottles of similar height and general body diameter but of varying bottle configurations, wherein such sorting results from the operation of a bottle conveying means which positions certain bottles of a selected configuration type in a predetermined disposition during transport and

selects and separates such certain bottles from other bottles of other configuration types, and which is readily adaptable to sorting of bottles at any stage of the preparation of the bottles for filling, including sorting prior to introduction of the bottles into a bottle washer.

Some of the objects and advantages of the invention having been stated, others will appear as the description proceeds, when taken in connection with the accompanying drawing, in which

FIGURE 1 is a plan view of the bottle sorting apparatus of this invention;

FIGURE 2 is a side view, in partial section, of the bottle sorting apparatus of FIGURE 1, taken generally along the line 2-2 in FIGURE 1.

Referring now more particularly to the drawing, the bottle sorting apparatus of this invention is there shown and broadly comprises a first bottle conveying means, indicated generally at 10 and a second bottle conveying means, indicated generally at 11. As will be brought out more fully hereinafter, the first conveying means 10 functions to guide a plurality of bottles along a first predetermined path of travel and includes a bottle conveyor 12, while the second bottle conveying means 11 is movable along a second predetermined path of travel intersecting the first path and functions to select certain bottles from among the plurality of bottles guided by the first conveying means 10 and convey those certain bottles to a further bottle conveyor 13. Each of the bottle conveyors 12, 13 is of a type widely known and frequently used in bottling plants, and these conveyors in and of themselves do not constitute a portion of this invention. For purposes of clarity, however, the arrangement and operation of such a conveyor will now be briefly described.

The conveyor 12 is formed by generally vertically extending side plates 15 and 16, spaced apart a predetermined distance. On opposing faces of the side plates 15, 16 and adjacent the upper extremity, are fixed suitable support blocks 18 and 19. A plurality of conveyor plates 20, interconnected one with another in a suitable manner, rest on the support blocks 18, 19 and form an endless movable member. Suitable means (not shown) are provided for moving the endless member formed by the conveyor plates 20, as in the direction of the arrow or to the right in FIGURE 1. The width of the conveyor plates 20, and the spacing between the vertically extending side plates 15, 16 is suitable to support a number of bottles 21, 22, and the movement of the conveyor plates 20 is effective to transport the bottles along the conveyor 12. The conveyor 13 is similarly constructed, and similar elements of the conveyor construction are identified by primed numerals similar to those applied to the elements of the conveyor 12.

In presenting bottles to the sorting apparatus of this invention, empty bottles returned to the bottling plant are removed from the crates in which they are returned, and placed vertically upright on the conveyor 12. Thereafter, the bottles are transported by the conveyor 12 to the sorting apparatus 10. Inasmuch as bottles are returned to the bottling plant without regard to grouping by configuration types, bottles moving along the conveyor 12 would be a random assortment of the configuration types in use by the plant. The configuration types may be, for example, a first type in which the bottle has a lower portion of smaller external diameter than the medial portion of the bottle, as represented by the bottles 21 in the drawing, and a second type in which the body of the bottle is substantially cylindrical and of uniform diameter, as represented by the bottles 22 in the drawing.

In order to sort a plurality of bottles including two configuration types such as described above, my invention includes the aforementioned first bottle conveying means 10 for guiding the bottles along a first predetermined path

of bottle movement. Preferably, such a means comprises guide rod members 24, 25, 26 and 27 supported to overlie and extend generally along the conveyor 12 transporting bottles to the bottle sorting apparatus. The guide rod members 24-27 are spaced apart a vertical distance so as to engage bottles 21, 22 at spaced points along the body portions thereof, and are spaced horizontally apart a distance suitable to cause the bottles to move into a substantially single file row (FIGURE 1).

In order to select certain bottles from among the plurality of bottles, such as the bottles 21, 22, guided along the first path of travel by the first bottle conveying means 10 including the conveyor 12 and the guide rods 24-27, the second bottle conveying means 11 of this invention comprises a bottle receiving means 28 supported adjacent the first path for rotation about a predetermined axis and provided with a circular series of bottle receiving pockets 29, which define the second path and successively traverse the intersection of the first and second paths upon rotation of the bottle receiving means 28 for receiving within the pockets 29 bottles guided along the first path. Before describing the particular operation of the bottle receiving means 28, and the characteristics of that means which, in accordance with my invention, contribute to the accomplishment of the desired result of sorting the bottles into groups by configuration types, it is considered appropriate to describe the construction of the bottle receiving means 28.

The bottle receiving means 28 comprises an upper disc member 30 and a lower disc member 31, which are vertically spaced apart at a desirable distance, as described more fully hereinafter, and supported for rotation about a vertically extending axis. Each of the disc members 30, 31 is provided with a plurality of radially outwardly extending projecting portions 32, 33, respectively, circumferentially spaced apart about the periphery thereof. The circumferential spacing and the configuration of the radially outwardly projecting portions 32, 33 is such that those portions define, between adjacent pairs thereof, radially outwardly opening pockets 29 (see FIGURE 1) adapted to receive therewithin a bottle, such as one of the bottles 21 and 22. The central portion of each of the disc members 30, 31 is provided with a hub portion 35, 36 respectively, and the hub portions are penetrated by a mounting shaft 38. The lower portion of the mounting shaft 38 is received by and rotatably supported in suitable bearing means, such as pillow block bearings 39, 40, which are in turn supported from a depending leg or portion 41 of the frame which supports the bottle sorting apparatus. Preferably, the pillow block bearing means 39, 40 are anti-friction type bearings, permitting the wheel means 11 to be freely rotatable. A suitable collar 42 is fixed to the shaft 38 above the uppermost bearing 39, to maintain the bottle receiving means 28 in the desired vertical position.

In order to receive bottles, such as the bottles 21, 22, within the radially outwardly opening pockets 29, the vertical axis about which the bottle receiving means 28 is rotatable, as defined by the shaft 38, is positioned so that the first path as defined by the first conveying means 10 is intersected by the second path as defined by the circular series of radially outwardly opening pockets and, upon rotation of the disc members 30, 31, the pockets traverse the intersection of the first and second paths. The guide rods 24 and 25, extending along the conveyor 12 and outwardly of the bottle receiving means 28, are preferably curved (FIGURE 1) to assist in urging bottles, such as the bottles 21, 22 into position to enter into the radially outwardly opening pockets 29.

In accordance with my invention, bottles are received within the pockets 29 in a first disposition or a second disposition in accordance with the configuration type of the particular bottle being received. More particularly, the radially outwardly opening pockets 29 are configured to receive therein a bottle moving along the first path to a predetermined depth with the pocket. Preferably, the con-

figuration of the pockets of the upper disc 30 is the same as the configuration of the pockets in the lower disc 31 so that a bottle having a cylindrical body portion of substantially uniform diameter throughout the major portion of the bottle height, such as a bottle 22 (FIGURE 2), is received to an equal depth within the pockets of the upper and lower discs 30, 31. Being received to the same depth within the pockets on both discs, such a bottle 22 is held therein at a vertical disposition, substantially parallel to the axis about which the discs 30, 31 rotate, as defined by the shaft 38. When a bottle 21, having a lower body portion of reduced diameter with respect to the medial body portion, is received within the pockets of the upper and lower discs 30, 31, the reduced diameter lower body portion enters into the pocket of the lower disc 31 to a greater extent than does the medial body portion into the pocket of the upper disc 30. As a result, such a bottle 21 is disposed in a second disposition, tilted outwardly with respect to the discs 30, 31, or at a skew angle with respect to the axis about which they rotate, as defined by the shaft 38 (see FIGURE 2).

In order to assure that bottles of respective configuration types are received as required within the pockets, my invention provides a means for resiliently urging bottles radially inwardly of the discs 30, 31 and into the pockets thereof. More particularly, a bottle engaging roller 44 is positioned adjacent the first path and on the opposite side of that path from the point at which bottles are first received in the pockets of the bottle receiving means 28. The bottle engaging roller 44 is so mounted as to be resiliently urged toward the pockets and engages the body portion of a bottle, such as the bottle 21, to urge the bottle radially inwardly and into the pockets. Preferably, the roller 44 is mounted for rotational movement about a point along a swing arm 45, which is in turn pivotally supported from a horizontally extending portion 46 of the support means for one of the guide rods 24-27. Suitable resilient means, such as a spring 47 encircling a bolt 48 penetrating a portion of the frame supporting the bottle sorter and an upwardly projecting lug on the swing arm 45 is provided for biasing the bottle engaging wheel 44 in the desired direction. Preferably, as shown in FIGURE 2, the bottle engaging roller 44 is positioned as to be more closely horizontally aligned with the lower disc 31 than with the upper disc 30, in order to assure that the lower body portion of a bottle, such as the bottle 21, is properly urged into the receiving pocket of the lower disc 31, in order that the bottle may be positioned in the appropriate disposition with respect to the discs.

Inasmuch as the first conveyor means 10 transports a group of bottles presented to the sorting apparatus (to the right in FIGURE 1), and the pockets of the discs 30, 31 traverse the first path to receive bottles therewithin, the movement of bottles by the conveyor 12 provides a motive force to rotate the discs 30, 31. In order to assure that rotation of the discs 30, 31 does not occur at rotational speeds which would possibly result in difficulty in the operation of the sorting apparatus, a braking means is provided for applying a braking force to the shaft 38. More particularly, the shaft 38 has secured thereto, beneath the lower support bearing 40, a suitable drum member 50, which is encircled by a brake band 51. An adjustable resilient biasing means, employing a bolt 53 penetrating one end of the band 51 and a compression spring 54 encircling the bolt 53, is provided for resiliently urging the brake band 51 into contact with the brake drum 50, while permitting control over the friction force applied thereby to limit the rotational speed of the discs 30, 31.

In order to separate bottles, such as the bottles 21, 22, transported along the first path by the first conveying means 10 into two groups according to bottle configuration types, my invention provides means for engaging bottles received within the pockets of the discs 30, 31 at one of the two aforementioned dispositions, and to retain engaged bottles within the respective pockets through a pre-

determined rotational movement of the discs and thereafter release the bottles at a location remote from the intersection of the first and second paths. Preferably, the means for engaging and retaining bottles includes a plurality of members each being associated with one of the pockets 29 of the bottle receiving means 28 and adapted to enter into the open mouth or upper extremity of a bottle, such as a bottle 22, in the vertical disposition, to thereby engage and retain such a bottle. Due to the placement of a bottle 21 having a reduced diameter lower portion, the engaging and retaining means are unable to enter into the outwardly tilted mouth or upper extremity of such a bottle, and such a bottle is neither engaged nor retained.

The bottle engaging and retaining means takes the form of a disc member 55 positioned above the first and second discs 30, 31 and having a centrally positioned hub portion 56 penetrated by the shaft 38. The engaging means disc 55 is thus fixed to the shaft 38, for rotation with the pocketed discs 30, 31. Mounted on the engaging means disc 55 for vertical pivotal movement, and extending radially outwardly thereof, are a plurality of bottle engaging finger members 58, each being positioned to overlie an associated pocket of the pocketed discs 30, 31. Preferably, each of the bottle engaging finger members 58 has an inner radial portion pivotally connected to a projecting stud 59 on the upper surface of the engaging means disc, and an outer portion which includes a depending hook 60. Each of the finger members 58 is adjustable in length, to permit positioning of the depending hook 60 at the necessary location to enter into and engage the mouth or open upper extremity of a bottle 22 upon downward movement of the finger member. Preferably, in order to reduce the possibility of damage to the bottles 22 being engaged and retained, at least the hook portion 60 of each of the finger members 58 is coated with a resilient shock absorbing plastic material, such as polyvinyl chloride.

In order to control the vertical position of the finger members 58 upon rotation of the engaging means disc 55 and to produce the cooperation necessary for sorting of bottles, means are provided for controlling the vertical movement of the finger members 58 to move those members vertically downwardly and into engagement with bottles 22 in a vertical disposition and to move the finger members 58 vertically upwardly upon transport of engaged and retained bottles through a predetermined rotational movement of the pocket within which such a bottle is received and retained. The means for this purpose is a part-circular cam element including a metal member 61 and a low friction contact surface member 62, supported from the frame of the sorting apparatus to encircle a major portion of the circumferential extent of the engaging means disc 55. The cam element is positioned to maintain the engaging fingers 58 in a raised position until those members overlie the intersection of the first and second paths, or the position at which a bottle is received within the pockets of the pocketed discs 30, 31 at one of the two dispositions. Upon rotation of the bottle receiving means 28 and receipt of a bottle, such as the bottle 22, within a pocket of the pocketed discs 30, 31, the finger member 58 associated with the pocket within which a bottle is received is moved beyond the end of the cam elements 61, 62, and released to drop vertically downwardly so that the projecting hook 60 enters into the open mouth or upper extremity of the bottle 22. Should the bottle received within the pocket be in the skewed disposition, such as the bottle 21, the release and dropping of the associated finger member 58, upon rotation beyond the cam element 61, 62 will not permit the hook portion 60 to enter into the upper extremity of the bottle 21, inasmuch as the skew angle or tilted disposition of such a bottle will place the open mouth beyond the location of the depending hook portion 60.

Upon further rotation of the pocketed discs 30, 31 and the engaging means disc 55, a bottle 22 into which the hook portion 60 of the associated finger member 58 has

penetrated will be retained within the pocket of the wheel means and removed from the conveyor 12 by the rotational movement of the wheel means. Upon removal from the conveyor 12, such a bottle 22 is traversed across a stationary table support 64, and is transported by rotation of the wheel means to a location remote from the intersection of the first and second paths. Upon a predetermined rotational movement of the discs 30, 31, 55, the finger member 58 engages an upwardly sloping portion of the cam elements 61, 62, and is raised thereby to withdraw the hook portion 60 from the mouth of the bottle 22. The upwardly sloping portion of the cam elements 61, 62 is so positioned that the hook portion 60 of the finger member 58 is withdrawn just as the bottle 22 is transported onto the moving surface of the conveyor 13, and the bottle is thereafter transported by the conveyor 13 to a bottle washer. Bottles 21 which have not been engaged and retained to be transported to the conveyor 13 continue to be transported by the conveyor 12, and proceed to a bottle washer or other next subsequent step in the bottling process.

In order to assure that bottles received within the pockets of the pocketed discs 30, 31 are properly transported by the conveyors 12, 13, guide means are provided to assure proper dispositions of bottles of both configuration types upon departure of those bottles from the pockets of the pocketed wheel means. More particularly, the inner lower guide rod 26, functioning to guide bottles along the first path, is provided with a slightly projecting portion adjacent the position at which a bottle 21 disposed in a tilted disposition is to be released from the pockets of the pocketed discs 30, 31 to proceed to travel with the conveyor 12. The purpose of the projecting portion of the guide rod 26 is to engage the lower portion of the body of a bottle 21 positioned in a tilted disposition, adjacent the lower extremity thereof, and return such a bottle to a vertical disposition for movement with the conveyor 12. Adjacent the remote location at which bottles 22 which have been engaged by finger members 58 and transported with rotation of the discs 30, 31, 55 have the finger members 58 removed therefrom through the engagement of those finger members with the rising portion of the cam element 61, 62 are positioned upper and lower guide rods 65, 66, which have projecting portions which engage the body portion of the bottles 22 and guide those bottles radially outwardly of the pockets and to a substantially central position on the conveyor 13 for travel therewith.

In summary, it is believed apparent that a mechanical bottle sorter apparatus has been described with reference to illustrations which is simply constructed and capable of sorting a random group of bottles of similar height and general body diameter into groups by configuration types. In the apparatus of this invention, the sorting of such a random group of bottles is performed by a first conveying means for guiding the bottles along a predetermined first path of travel and into radially outwardly opening pockets of a rotatable bottle receiving means forming a portion of a second bottle conveying means. The configuration of the pockets of the bottle receiving means is such that certain bottles of one configuration type are received therein in a disposition parallel to the axis about which the means rotates, while other bottles are received in a skewed disposition. Cam controlled fingers overlying each of the pockets move downwardly to enter into the open mouths of bottles held in the first disposition, and retain those bottles in the respective pockets as the bottle receiving means rotates, thus transporting the engaged and retained bottles along a second predetermined path to a location remote from the intersection of the first and second paths at which they enter the pockets. Bottles received at a skew disposition are neither engaged nor retained, and are thus permitted to continue along the first path of bottle travel.

In the drawing and specification, there has been set

forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Apparatus for sorting bottles of varying configuration types into groups by configuration types and comprising: first bottle conveying means for guiding a plurality of bottles along a first predetermined path of travel, bottle receiving means supported adjacent said first path for rotation about a predetermined axis and having a circular series of bottle receiving pockets defining and movable along a second predetermined path of travel intersecting said first path and positioned to traverse said intersection upon rotation of said receiving means, said pockets being configured for receiving certain bottles of a predetermined configuration type at a first disposition with respect to said axis and for receiving the remainder of said plurality of bottles at another disposition, and bottle engaging and retaining means operatively associated with said bottle receiving means for engaging said certain bottles when the same are received within said pockets and for retaining engaged bottles during rotation of said bottle receiving means through a predetermined rotational angle to remove said certain bottles from said first path and convey the same along said second path.
2. An apparatus as claimed in claim 1 wherein said bottle receiving means comprises:
 - a shaft supported for rotation about a vertical axis, and
 - first and second pocketed disc members mounted on said shaft at predetermined vertically spaced apart positions, each of said disc members having a circumferential series of radially outwardly projecting legs with said legs of the upper pocketed disc member overlying those of the lower pocketed disc member, each pair of vertically aligned legs defining one of said pockets with the next adjacent pair of vertically aligned legs.
3. Apparatus as claimed in claim 2 wherein said pockets have a configuration diverging radially outwardly of said axis and such that said certain bottles are disposed therewithin parallel said axis and said remaining bottles are disposed therewithin at a skew angle to said axis.
4. An apparatus as claimed in claim 3 wherein said engaging and retaining means comprises:

- a supporting disc member mounted on said shaft above said upper pocketed disc member and rotatable with said shaft,
 - a plurality of finger members pivotally connected to said supporting disc member and extending radially outwardly thereof, each of said finger members overlying one of said pockets and being adapted to enter the upper extremity of one of said certain bottles received therewithin, and
 - cam means for controlling vertical movement of said finger members to move the same toward engagement of a bottle within the associated pocket at said intersection and away from such engagement at a location remote therefrom.
5. Apparatus for sorting bottles into groups comprising:
- first bottle conveying means for guiding a plurality of bottles along a predetermined path of travel,
 - pocketed disc means supported adjacent said first path for rotation about a predetermined axis and having a circumferential series of bottle receiving pockets movable along a second predetermined path of travel intersecting said first path upon rotation of said disc means for receiving said plurality of bottles as the same traverse the intersection of said paths,
 - a plurality of finger members supported for rotation with said disc means, each of said finger members being supported adjacent one of said circumferential series of pockets for movement relative to a bottle received therein between a retracted position and a bottle retaining position, and
 - means for controlling movement of each of said finger members relative to a bottle received within said adjacent one pocket and for governing engagement of individual finger members with individual bottles and retention of engaged bottles within respective pockets so that retained bottles are removed from said first path and conveyed along said second path.

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