Jan. 14, 1964 L. H. SCHWARZ 3,117,669

SORTING MACHINE FOR BOTTLES AND THE LIKE

Filed Jan. 30, 1962 2 Sheets-Sheet 1

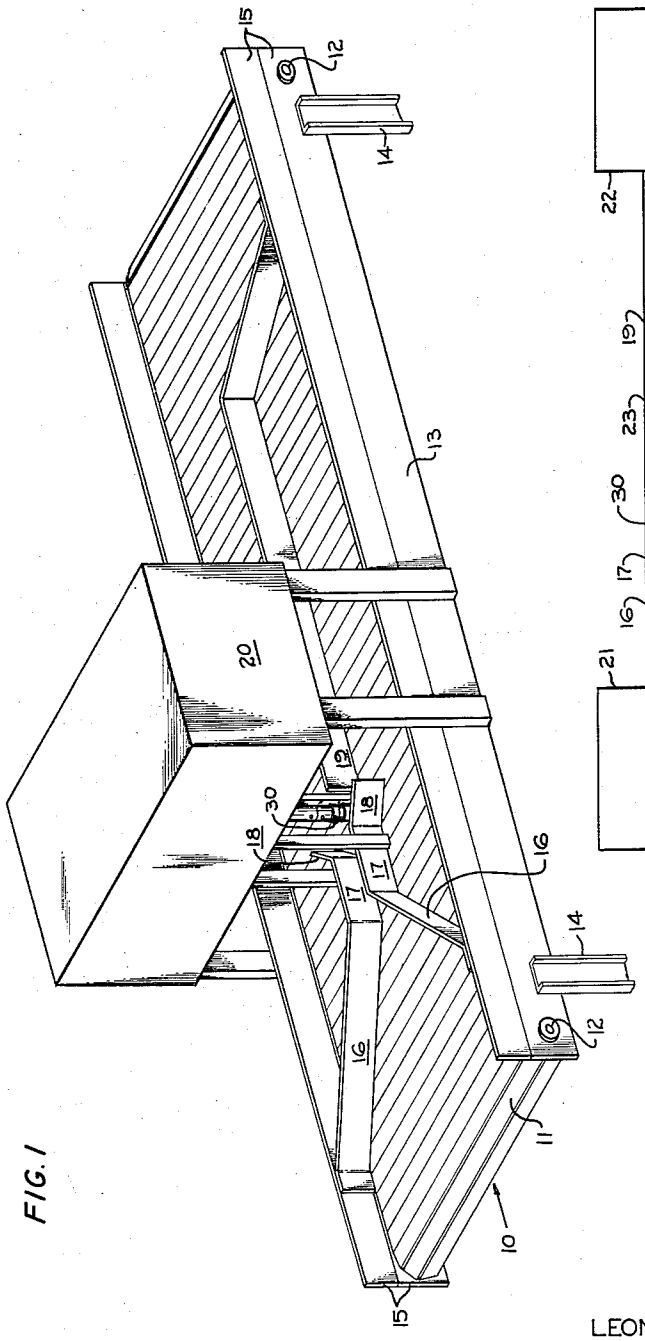


FIG. 1

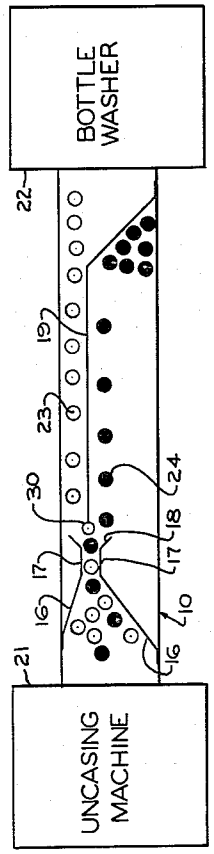


FIG. 2

INVENTOR.
LEONARD H. SCHWARZ

BY Lindsey, Prutzman and Hayes
ATTORNEYS

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FIG. 3

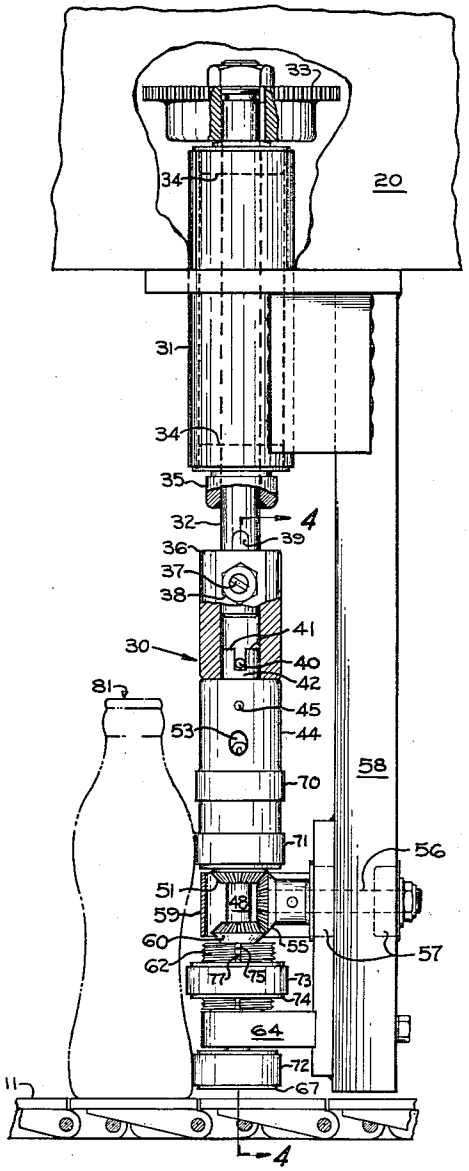
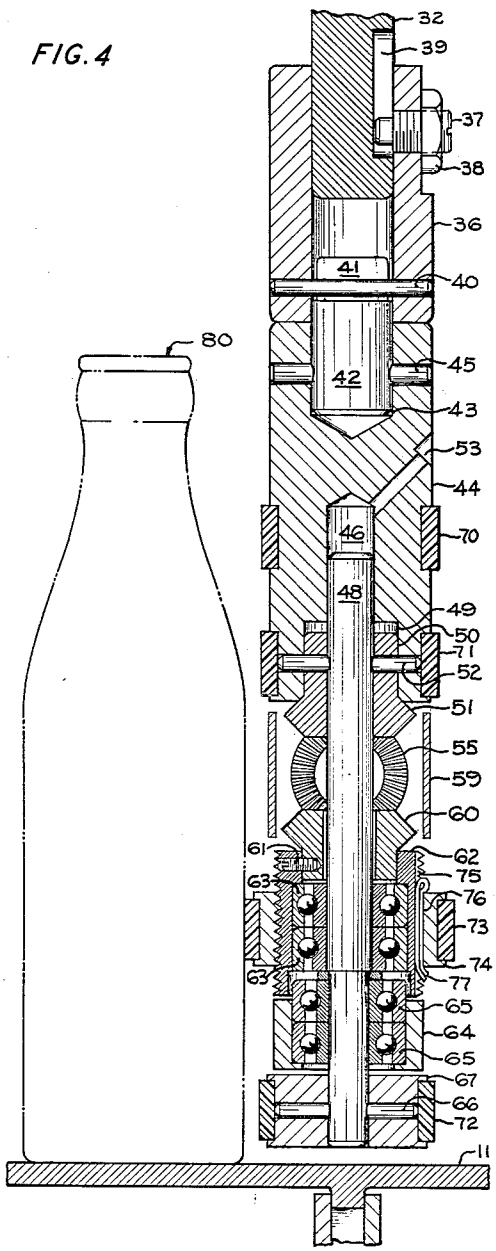


FIG. 4



INVENTOR.
LEONARD H. SCHWARZ
BY Lindsey, Prutzman and Hayes
ATTORNEYS

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SORTING MACHINE FOR BOTTLES AND THE LIKE

Leonard H. Schwarz, 98 Hunter Drive, West Hartford, Conn.

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12 Claims. (Cl. 209—80)

The present invention relates generally to sorting equipment for items of varying vertical configuration or profile. While not limited thereto, the invention has particular utility in the beverage bottling business for separating bottles of different shapes.

In the bottling industry and particularly the bottling of carbonated beverage, it is the usual practice to reuse the bottles in which the beverage is sold, the bottles being returned to the bottler by the dealer or customer after the contents have been consumed. It is also a common practice for bottlers to sell beverages in bottles of different shapes in order to distinguish or identify the various flavors or brands. Even the same bottler will frequently use different shapes for different lines of his products such as, by way of example, Coca-Cola bottles having a well-known indented profile and used only for bottling Coca-Cola, and conventional straight-sided bottles used for other carbonated beverages. While the bottles returned to the bottler may be segregated to some extent, there is no effective or practical way to compel the dealer or customer to keep the different kinds of bottles separated and such separation generally has to be made by the bottler before the bottles can be reused, usually by a hand operation.

Accordingly, it is an object of the invention to provide a machine of simple and economical design which may be used to separate bottles or like articles, according to profile in an automatic operation. Included in this object is to provide such a machine which operates at a suitably rapid rate, which is accurate and dependable in operation and which is convenient to use with a minimum of skill and training.

A further object is to provide such a machine having a small number of moving parts and functioning in an efficient manner such that repair or replacement is not normally required over long periods of time and the operation is safe and effective under normal conditions of use.

Another object is to provide a machine of the character described which may be readily designed or adjusted to accomplish a separation of a wide range of shapes or profiles of bottles and the like.

A further object is to provide such a machine which can be built at low cost of readily available parts, which is rugged and yet compact in size and which can be readily integrated for use with other automatic machinery so as to avoid unnecessary hand labor.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application which will be indicated in the appended claims.

In the drawings:

FIG. 1 is a perspective view of a complete machine embodying the present invention;

FIG. 2 is a diagrammatic view illustrating the operation of the machine;

FIG. 3 is an enlarged fragmentary vertical side view partially in cross section of the separator assembly in contact with a bottle having an indented profile and shown in phantom; and

FIG. 4 is an enlarged cross-sectional view taken along the lines 4—4 of FIG. 3 and showing the separator in

contact with a straight-sided bottle shown in phantom.

For convenience and simplicity of presentation, the invention will be described in connection with a machine designed to separate straight-sided bottles from bottles having an indented profile. However it will be apparent that the machine of the present invention can readily be adapted to separate other articles or bottles which differ variously in profile.

Referring first to FIGS. 1 and 2 of the drawings, the embodiment of the machine of the present invention shown therein employs a conveyor **10** which may be of any suitable design for advancing bottles through the machine in an upright position. In the specific embodiment, the conveyor **10** comprises an endless belt formed of pivotally connected slats or plates **11** and mounted on shafts **12** at opposite ends of the frame or table **13** mounted at a convenient height such as by legs **14**. Power means (not shown) is provided for driving the conveyor **10** so that the top surface moves to the right as viewed in FIGS. 1 and 2. In addition to the side plates **15**, the table is provided with a pair of guide plates **16** converging at the center to form an aisle between the straight portions **17** which is just of sufficient width to admit a single line or row of bottles for contact with the separator assembly **30** depending from the casing **20**. The flared ends **18** on the guide plates **16** define a passageway directed to opposite sides of the separator assembly **30** and a divider strip or fence **19** extending rearwardly from the separator assembly **30** and connected to one of the side plates **15** divides the table into a first passageway to the exit end of the machine for the one type of bottle which has been separated by the machine and forming a collecting area for the other type.

FIG. 2 diagrammatically illustrates a typical installation of the machine and the functioning thereof. As will be apparent, the machine can readily be integrated with other automatic machinery such as is conventionally used in bottling plants and the like so as to provide a continuous operation. By way of example, the bottles to be separated may be fed to the conveyor from a conventional uncasing machine indicated diagrammatically at **21** and the selected bottles may be fed continuously at the exit end to a bottle washer indicated diagrammatically at **22**. For illustrative purposes, the selected bottles having one form of profile are indicated in FIG. 2 by the white discs **23** and the remaining bottles having a different profile are indicated by the black discs **24**. As the bottles are fed onto the left-hand end of the machine, as viewed in FIG. 2, the two types of bottles which are intermixed are moved to the right by the conveyor **10** and are caused to form a single file or line as they move through the passageway defined by the straight portions **17** of the guide plates **16**. As each lead bottle comes into engagement with the separator assembly **30**, it is automatically diverted to the right or left of the separator assembly **30** and hence, the divider strip **19** according to the profiles for which the machine has been set. The conveyor **10** thereupon conveys the selected bottles to the exit end of the machine while the remaining bottles collect in the pocket formed by the divider strip **19** from which they may be periodically removed.

Turning now more particularly to FIGS. 3 and 4 showing the details of an embodiment of the separator assembly **30**, a journal housing **31** is provided in the base of the casing **20** through which extends a rotatable spindle or shaft **32** having a gear **33** fixed thereto by means of which the shaft **32** may be driven in either direction by suitable power means (not shown). Suitable antifriction bearings **34** are provided in the journal housing **31**. Attached to the bottom of spindle **32** below the collar **35** is an adjustable sleeve **36** which is fixed in adjusted position by means of a set screw **37** held by

lock nut 38 and received in the elongated slot 39 in the spindle 32. A transverse pin 40 is mounted in the lower end of sleeve 36 for engagement by a socket provided by the tangs 41 on the end of a cylindrical coupling member 42 seated in a recess 43 in the cylinder 44 and secured thereto by the transverse pin 45. The lower end of cylinder 44 has an axial recess 46 for the reception of one end of the shaft 48 and is counterbored at 49 to receive the hub 50 of a bevel gear 51, the bevel gear 51 and shaft 48 being secured to the cylinder 44 for rotation therewith by the transverse pin 52. The diagonal opening 53 is for lubrication purposes.

Meshing with the bevel gear 51 is an idler bevel gear 55 fixed to rotatable stub shaft 56 mounted in bearings 57 in a supporting post 58 depending from and rigidly fixed at its upper end to the journal housing 31. The idler gear 55 also meshes with a bevel gear 60 secured by set screw 61 to an externally threaded sleeve 62 which is rotatably mounted on the shaft 48 by antifriction bearings 63. The gears 51, 55 and 60 are enclosed for protective purposes by a sheet metal shield or guard 59 fastened to the post 58. The shaft 48 is supported below the sleeve 62 by a yoke 64 fixed to the post 58 and engaging the antifriction bearings 65. Secured to the bottom end of shaft 48 by pin 66 is a disc 67 of approximately the same diameter as cylinder 44.

Fixed to the cylinder 44 and axially spaced thereon are a pair of friction rings 70 and 71 preferably formed of high-friction plastic material. A similar ring 72 is secured to the disc 67. A fourth ring 73 is carried by a threaded collar 74 threadably mounted on the sleeve 62. By reason of the threaded mounting, the collar 74 can be adjusted vertically on the sleeve 62 merely by turning the collar 74 relative to the sleeve 62. A slot 75 in the collar 74 and a mating slot 76 in the sleeve 62 are provided to receive a cotter pin 77 to retain the collar 74 in adjusted position. Preferably a thread pitch is selected for the mating surfaces of the collar 74 and sleeve 62 so that the height of the collar 74 can be adjusted in suitable increments for each turn.

As shown in the specific embodiment, the friction rings 70, 71 and 72 are all of the same diameter and, of course, are all rotating in the same direction since the shaft 48 to which the disc 67 is fixed is also fixed to the cylinder 44. The friction ring 73 on the collar 74, however, is of larger diameter and rotates in the opposite direction by reason of the gear train 51, 55 and 60 which drives the sleeve 62 in a reverse direction relative to the cylinder 44. As a result, any bottles moved into engagement with the separator assembly will be shifted to opposite sides depending on the profile of the bottles.

The operation is illustrated in FIGS. 3 and 4 of the drawings by the two bottles 80 and 81 shown in phantom. The bottle 80 is straight-sided and therefore, will contact the friction ring 73 on the collar 74 which is the ring of greatest diameter. Accordingly, the bottle 80 will be moved in the direction of rotation of the collar 74. The bottle 81, however, is an indented bottle and as a result, it will not engage with the friction ring 73 but instead will engage with the lowermost friction ring 72 on the bottom disc 67 and one or more of the friction rings 70 and 71 on the cylinder 44, all rotating in a counter direction thus causing the bottle to be diverted in the opposite direction and effectively causing a separation of the bottles according to profile. Only a very small amount of movement of the bottle to either side of the separator assembly is required since once the bottles have been diverted to either side of center the action of the conveyor will assist in completing the separating movement. Depending upon the direction of rotation of shaft 32, of course, either form of bottle may be selected for conveyance to the succeeding operation by the conveyor 10.

As will be apparent, the vertical height of the collar 74 can be readily adjusted to register with the indentation of the particular type of bottle to be separated or sorted and the rings 70, 71 and 72 provide engagement for straight-sided bottles having a wide range of heights. The friction rings 70, 71 and 72 on the one hand and friction ring 73 on the other provide, in effect, counter-moving drive elements in the form of wheels of varying diameter which may be adjusted or varied in elevation as required to provide for the separation of bottles or other items having a wide range of distinguishing profiles on the basis of which separation or sorting is to be carried out.

While the invention has been described in detail in connection with a specific embodiment of the invention, it is to be understood that variations and modifications of the apparatus within the skill of the art may be made within the scope and teaching of the invention.

I claim:

1. A sorting machine for separating articles such as bottles having varying vertical profiles comprising conveyor means for forming an advancing file of articles to be separated, and a separator assembly comprising drive elements having first and second separator surfaces vertically disposed at different heights and extending different distances toward the articles of said advancing file for selective engagement sequentially therewith according to the profile thereof and diverting articles of different profile to opposite sides of the separator assembly.

2. A sorting machine for separating articles such as bottles having varying vertical profiles comprising conveyor means for forming an advancing file of articles to be separated, and a separator assembly mounted for engagement sequentially by the articles of said advancing file, said separator assembly comprising a plurality of counter-rotating drive elements having rotational axes intersecting said conveyor, said elements being disposed at varying heights for selective engagement with the side walls of articles of different vertical profile whereby articles of different vertical profile are diverted to opposite sides of the separator assembly.

3. A sorting machine for separating articles such as bottles having varying vertical profiles comprising conveyor means for forming an advancing file of articles to be separated, and a separator assembly mounted for engagement sequentially by the articles of said advancing file, said separator assembly comprising a plurality of counter-moving drive elements having rotational axes intersecting said conveyor, said elements being disposed at different heights and projecting varying distances toward the advancing file of articles whereby articles of different vertical profile will be engaged selectively by the counter-moving drive elements and diverted to opposite sides of the separator assembly.

4. A sorting machine for separating articles such as bottles having varying vertical profiles comprising conveyor means for forming an advancing file of articles to be separated, and a separator assembly mounted for engagement sequentially by the articles of said advancing file comprising a vertically mounted spindle having vertically spaced drive wheels secured thereto for rotation therewith, a third drive wheel mounted between said vertically spaced drive wheels, and means for rotating the third drive wheel in a direction opposite to that of the spindle and the said vertically spaced drive wheels.

5. A sorting machine as set forth in claim 4 wherein the drive wheels are provided with a surface of high-friction plastic material.

6. A sorting machine as set forth in claim 4 wherein the vertical position of the third drive wheel between the vertically spaced drive wheels is adjustable.

7. A sorting machine for separating articles such as bottles having varying vertical profiles comprising conveyor means for forming an advancing file of articles to be separated, and a separator assembly mounted for engagement sequentially by the articles of said advancing

file comprising a vertically mounted spindle having vertically spaced drive wheels secured thereto for rotation therewith, an externally threaded sleeve rotatably mounted intermediate the said vertically spaced drive wheels, means for rotating the sleeve in a direction opposite to that of the spindle, and a third drive wheel comprising a collar threadably engaged on the sleeve and adjustable axially thereon.

8. A sorting machine as set forth in claim 7 including locking means for locking the collar in adjusted vertical position on the sleeve.

9. A sorting machine as set forth in claim 7 wherein the sleeve and collar are provided with longitudinal slots adapted to move into registry at selected rotated positions of the collar relative to the sleeve, and the locking means comprises a pin insertable into the slots when the slots are in registry.

10. A sorting machine for separating articles such as bottles having varying vertical profiles comprising a frame, conveyor means of the endless-belt type on the frame for advancing the articles in upright position along the frame, guide rails disposed in converging relationship forming a passageway confining the articles to a single file, a separator assembly comprising a plurality of counterrotating drive elements located in alignment with said passageway for engagement sequentially by the articles of said single file, said counterrotating drive elements being located at different elevations for selective engagement with articles of different vertical profile and diverting articles of different vertical profile to opposite sides of the separator assembly, and a fence extending rearwardly from the separator assembly for maintaining the separation of the articles.

11. A sorting machine for separating straight-sided bottles from bottles having an indented profile comprising a frame, a conveyor for moving bottles along the frame in an upright position, guide rails for converging the bottles to a single row, a separator assembly mounted for engagement individually by the advancing row of bottles comprising a rotatable spindle, a plurality of vertically spaced friction rings on the spindle for rotation therewith and engageable with the top and bottom portions of a bottle having an indented profile, a friction ring of greater diameter than said spaced friction rings and mounted therebetween for engagement with a straight-sided bottle, means for driving the friction ring of greater diameter in a reverse direction relative to the vertically spaced friction rings, and a fence extending rearwardly from the separator assembly for maintaining separation between the bottles diverted to opposite sides of the separator assembly by the counterrotating friction rings.

12. A sorting machine for separating articles such as bottles having varying vertical profiles comprising conveyor means for forming an advancing file of articles to be separated, and a separator assembly having coaxially mounted counter-moving drive wheels of different diameter disposed at different heights for selective engagement sequentially by the articles of said advancing file according to the profile thereof and diverting articles of different profile to opposite sides of the separator assembly, and means to rotate said drive wheels in opposite direction.

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