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CONTAINER SEPARATING APPARATUS

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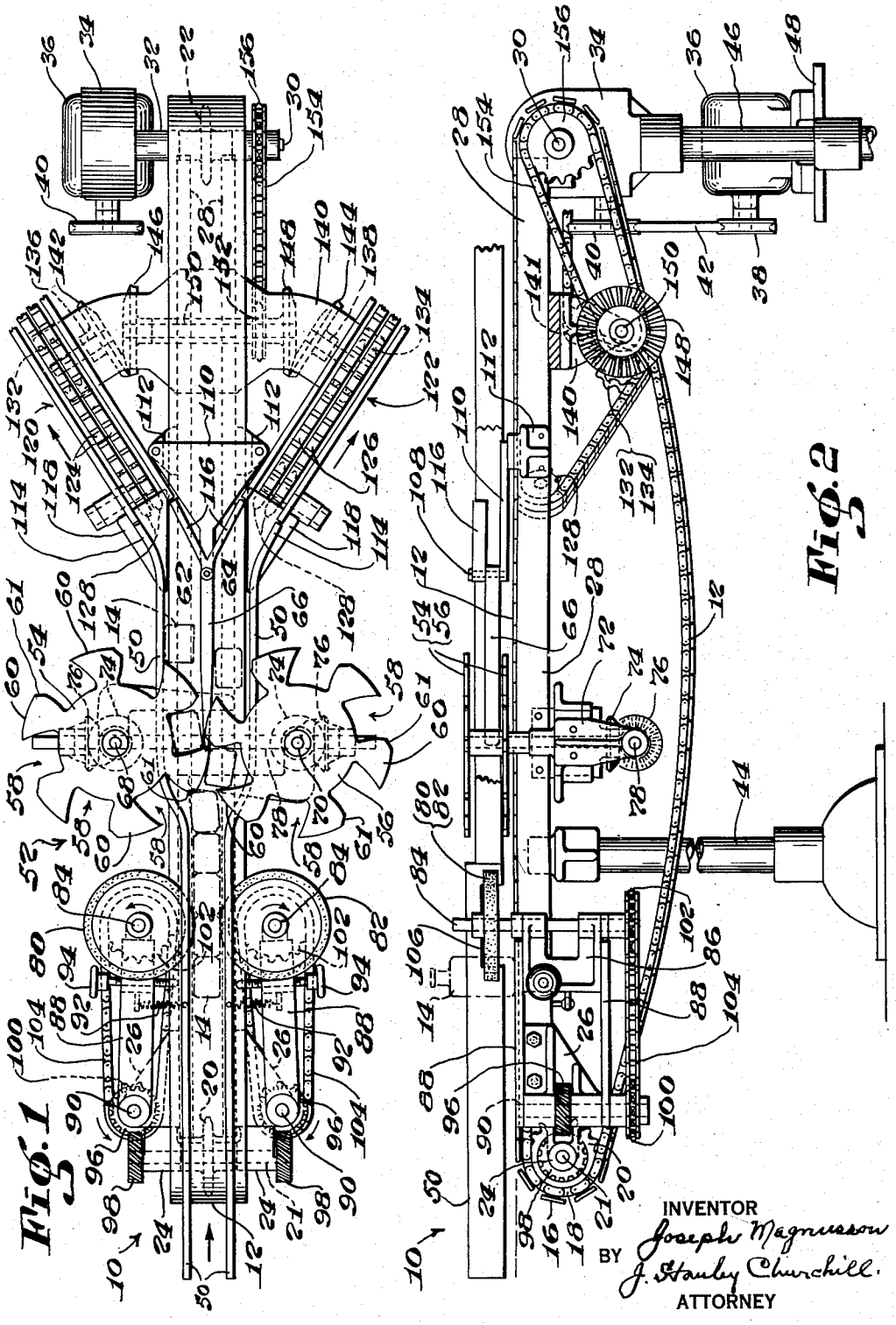


Fig. 1

Fig. 2

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CONTAINER SEPARATING APPARATUS

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5 Claims. (Cl. 198—31)

This invention relates to a container separating apparatus.

The invention has for an object to provide a novel and improved container separating apparatus in which provision is made for distributing containers being conveyed in a line to form two lines of containers in a simple and efficient manner.

A further object of the invention is to provide a novel and improved separating mechanism capable of diverting successive containers being conveyed in a line in a manner such as to distribute alternate containers into separate paths.

With these general objects in view and such others as may hereinafter appear, the invention consists in the container separating apparatus and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawing illustrating the preferred embodiment of the invention, Fig. 1 is a plan view of a container separating apparatus embodying the present invention; and Fig. 2 is a side elevation of the same.

In general, the present invention contemplates the provision of a simple and efficient apparatus for separating containers being conveyed in a line into two separate paths in a manner such that alternate containers are delivered to each of the two paths to form two separate lines thereof. Among the uses for which the present device is adapted is the separation of a line of containers being delivered from a machine operating at a relatively high speed of production, such as for example, a multiple head bottle cleaning machine, in order to form two separate lines of containers to be delivered to subsequent machines operating at relatively lower speeds, such as bottle filling machines, whereby a continuous flow of containers from the high speed machine may be maintained. In the preferred embodiment of the invention, provision is made for diverting successive containers being conveyed in the single line into separate paths by means of a novel separating mechanism having provision for delivering alternate containers to their respective paths as they are passed therethrough, as will be hereinafter described.

Referring now to the drawing which illustrates the preferred embodiment of the invention, the container separating apparatus includes a conveying unit 10 having a continuously operated belt 12 upon which the incoming containers 14, herein shown as bottles, are conveyed in a line and in contiguous relationship from a preceding machine or other source of supply. The conveyer belt 12 may and preferably will be of the chain type, being provided with flat metal plates 16 secured to the chain 18, and as herein shown, the chain is arranged to run over an idler sprocket 20 and a driven sprocket 22. The idler sprocket 20 is fast on a shaft 21 journaled in bearings 24 formed in brackets 26 attached to side rails 28 of the conveying unit. The driven sprocket 22 is secured to a shaft 30 journaled in a bracket 32 attached to the side rails 28. The shaft 30 extends from a housing 34 enclosing a gear reduction unit which may be of any usual or preferred construction and which is connected to a driving motor 36 through pulleys 38, 40 and belt 42. The conveying unit 10 is supported upon standards 44, 46, the motor 36 being mounted upon a bracket 48 attached to the standard 46.

In the illustrated embodiment of the invention, the containers 14 are guided in a single line upon the belt 12 between guide rails 50 to separating mechanism indicated generally at 52. As herein shown, the separating mechanism comprises a pair of cooperating disks 54, 56 which are mounted for horizontal rotation upon either side of the conveying unit 10 and which are provided with peripheral openings or apertures 58 arranged to receive successive containers presented thereto. As illustrated in Fig. 1, the openings 58 of one disk 54 are arranged to coincide with the closed portions 60 of its cooperating disk 56 so that in operation, as the disks are rotated, the containers delivered thereto are successively diverted from the line by the closed portions 60 into the openings 58, succeeding containers being alternately transferred to openings in opposing disks. Upon leaving the disks 54, 56 the containers are delivered to separate paths 62, 64 formed by an intermediate rail 66 and extensions of the guide rails 50 which are spread apart to accommodate the separate lines of containers at a point adjacent the receiving end of the separating mechanism, as clearly shown in Fig. 1.

Provision is made for maintaining the opposing disks 54, 56 in their cooperating relationship as above described so that succeeding containers are alternately received in the openings 58 first in one disk and then in the opposite disk. As herein shown, the disks are mounted upon similar shafts 68, 70 vertically supported in a bracket 72 attached to the side rails 28. The lower ends of each shaft are provided with bevel gears 74 which are arranged to mesh with similar cooperating bevel gears 76 fast upon a cross-shaft 78 journaled in bearings in the bracket 72. Thus, in operation, rotation of one disk will cause its cooperating disk to be rotated a corresponding amount so that the predetermined relationship of the disks may be maintained. As herein shown, a second pair of disks 54, 56 coincident with the first pair and arranged at a different level may be provided in order to provide suitable support for the containers being passed through the mechanism. The spaced disks are

arranged to straddle the guide rails, as illustrated in Fig. 2.

In the operation of the illustrated device, the containers are advanced on the conveyer belt 12 until the foremost container engages the separating disks, and upon continued movement of the line of containers, the latter may operate to rotate the normally idle disks through the pressure of the containers themselves being advanced by the conveyer 12. However, because of the relatively light weight of the containers, provision is made for positively urging the line of containers into the separating mechanism, and as herein shown, this may be accomplished by frictional engagement of the containers to force the line toward and into engagement with the disks to cause the latter to rotate. As herein shown, horizontally mounted friction wheels 80, 82 are provided upon either side of the conveyer unit 10 which are arranged to yieldingly and cooperatively engage the opposite sides of the containers in the line to force the containers forward as the containers are advanced thereto upon the continuously moving belt 12. The opposing friction wheels are fast upon similar vertical shafts 84 journaled in brackets 86 which latter are secured upon the ends of arms 88 pivotally mounted upon vertical shafts 90. The pivotally mounted units are urged toward the conveyer to present the friction wheels into operative engagement with the sides of the containers by springs 92, stop screws 94 being provided to limit the movement of the units when the conveyer is free of containers.

Provision is made for driving the friction wheels through connections from the idler sprocket shaft 21. As herein shown, the vertical shafts 90 are journaled in bearings formed in the brackets 26 and are provided with spiral gears 96 arranged to mesh with similar gears 98 secured upon either end of the idler sprocket shaft 21. The lower ends of vertical shafts 90 and 84 are provided with sprockets 100, 102 which are connected by chains 104 as shown in Fig. 1. Thus, it will be seen that as the containers are advanced upon the belt 12, the friction wheels will operate to force the line of containers into engagement with and through the separating mechanism during the operation of the machine. The friction wheels may and preferably will be faced with rubber, cork or other suitable material for engagement with the containers. It will be observed that the ratio between the sprockets 100, 102 is such that the friction wheels 80, 82 will be driven at a rate such as to advance the containers slightly faster than the normal movement of the containers upon the belt 12 so that in the event of a break in the line the friction wheels will operate to advance succeeding containers into contiguous relationship with those which have passed therethrough. In the event of a jam in the line so that further forward movement of the containers is stopped, no damage will result since the frictionally engaged wheels will merely slip against the surface of the adjacent containers. As indicated in Fig. 2, suitable openings 106 are provided in the guide rails 50 for the friction wheels to operate.

From the description thus far it will be observed that the line of containers delivered to the conveyer belt 12 will be forcibly urged through the separating mechanism and that the latter operates to divide the line into two separate paths to be delivered to different machines for subsequent operations. Thus in the operation of the present device, it will be seen that the necessity for timing the operation of the disks with the speed of the containers is eliminated since the separating disks 54, 56 are driven only when engaged by the containers as above described. It will be observed that one corner of each closed portion or tooth 60 of the disks is cut away to provide flat surfaces 61 against which successive containers are urged to effect rotation of the disks. When the foremost container is diverted from the line into one of the openings in the disk so that it is separated from the succeeding container, the latter engages the flat surface 61 of a succeeding closed portion to continue the rotation of the disks, such closed portion having been rotated into position for such engagement by the preceding container.

In practice, the size of the disks and the openings therein are carefully coordinated with the size of the container so that in operation, during the diversion of the foremost container into an opening of one disk by a closed portion of its cooperating disk, the succeeding container remains in engagement therewith thus effecting continued rotation of the disks until a succeeding bearing portion 61 of a disk has been rotated into position to be engaged by the container. At this time the foremost container has been slidingly separated from the line and the succeeding container takes up the rotation of the disks. The preceding containers already engaged within the apertures which are urged forwardly by the frictional engagement of the bottoms of the containers upon the moving conveyer belt 12, also assist, to some extent at least, in rotating the disks. With this construction it will be seen that liability of jamming of the containers in the separating disks is reduced to a minimum since in operation, when the flow of containers is terminated, the separating disks come to rest and cannot start again until the containers are again started forward. Although, in its preferred form, the invention contemplates the provision of separating disks operated by engagement of the containers as described, it is not desired to limit the invention in this respect.

Upon being released from the delivery end of the separating mechanism the containers are advanced along their respective paths 62, 64 upon the conveyer belt 12 which, as illustrated, is of sufficient width to accommodate the two lines of containers thus formed. As herein shown, the intermediate rail 66 is secured by a bolt 108 to a supporting plate 110 extending transversely across the conveyer and which is supported upon brackets 112 attached to the side rails 28. The two lines of containers being thus advanced are then guided between guide rail extensions 114, 116 and across bridge plate 118 onto separate conveyers 120, 122 to be delivered to their respective machines. The conveyers 120, 122, as herein shown, are angularly arranged with respect to the conveyer belt 12 and are provided with double chain belts 124, 126, which may and preferably will be driven through connections from the driven sprocket shaft 30 at the delivery end of the device. As herein shown, each pair of chains is arranged to run over idler sprockets 128, 130 at one end of the respective conveyers, the further end not being shown, and over driven sprockets 132, 134 fast upon shafts 136, 138 journaled in a bracket 140, depending from the underside of the conveyer 10, and thence over a pair of guide sprockets indicated at 141 in Fig. 2 for holding the chain in engagement with the drive sprockets 132,

134. The shafts 136, 138 are also provided with bevel gears 142, 144 which are arranged to mesh with similar bevel gears 146, 148 secured to either end of a cross shaft 150 also journaled in the bracket 140. The shaft 150 is also provided with a sprocket 152 which is connected by a chain 154 to a sprocket 156 fast on the conveyer shaft 30.

From the above description it will be observed that the present apparatus is capable of distributing alternate containers from a single run conveyer to two branch conveyers in a simple and efficient manner and is particularly adapted for the separation and distribution of containers being delivered from one machine at a relatively high rate of speed to two separate machines running at relatively lower speeds whereby a continuous flow of containers from the high speed machine may be maintained. It will also be observed that the illustrated separating mechanism is arranged to accommodate itself to the rate of speed at which the containers are delivered thereto so that need for timing the mechanism with the rate at which the containers are delivered is entirely eliminated.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a container separating apparatus for use in separating substantially rectangular containers, in combination, means for supporting a plurality of containers in a line, means for advancing said line upon the supporting means, and means operated by engagement of the containers therewith for separating the line of containers to form two lines comprising a pair of cooperating rotatable members having substantially rectangular apertures therein for the reception of the containers in the line arranged to alternately divert successive containers delivered thereto into separate paths, the closed portions of said rotatable members being wedge shaped and adapted to enter between adjacent containers to guide them into their respective apertures, said apertures being of a depth substantially equal to the thickness of a container received therein whereby to effect positive separation of the containers to be discharged into said separate paths free of bodily contact with adjacent containers.

2. In a container separating apparatus, in combination, a conveyer upon which the containers are moved in a line, and means operated by engagement of the containers therewith for separating the line of containers to form two lines comprising a pair of cooperating rotatable members having apertures therein for the reception of successive containers in the line and arranged to alternately divert successive containers delivered thereto into separate paths, said apertures being of a depth substantially equal to the thickness of the containers received therein, the open and closed portions of opposed rotatable members cooperating to effect discharge of the containers with their side walls in the same relative position with respect to the conveyer as when they were delivered thereto, said conveyer passing between and beyond said rotary members whereby to permit the containers to be carried through said apparatus and discharged into separate paths free of bodily contact with adjacent containers.

3. In a container separating apparatus for use in separating substantially rectangular containers, in combination, a conveyer comprising a moving belt by which the containers are moved in a line, and means operated by engagement of the containers therewith for separating the line to form two lines comprising a pair of cooperating rotatable members having substantially rectangular apertures therein for the reception of successive containers in the line and arranged to alternately divert successive containers delivered thereto into separate paths, said apertures being of a depth substantially equal to the thickness of the containers received therein, the open and closed portions of opposed rotatable members cooperating to maintain the containers with their side walls in the same relative position with respect to the belt during the separating operation, said conveyer passing between and beyond said rotary members whereby to permit the containers to be carried through said apparatus and discharged into separate paths free of bodily contact with adjacent containers.

4. Apparatus for separating a single line of substantially rectangular containers to form two lines thereof comprising, in combination, a pair of spaced rotary members mounted for rotation in opposite directions, and a continuously driven belt upon which the containers are moved in a straight line and in contiguous relation into engagement with said rotary members to effect rotation thereof, said rotary members having alternate closed portions and substantially rectangular apertures formed therein, the closed portions of one rotary member cooperating with the apertures in the other rotary member to divert successive containers delivered thereto into the apertures of opposed rotary members during rotation thereof, said apertures being of a depth substantially equal to the thickness of a container received therein, said continuously moving belt passing between and beyond said rotary members to effect withdrawal of the containers from said apertures when they arrive at the discharge side of the apparatus and to permit the containers to be carried through said rotary members and discharged into separate paths free of bodily contact with adjacent containers.

5. Apparatus for separating a single line of substantially rectangular containers to form two lines thereof comprising, in combination, a pair of spaced rotary members mounted for rotation in opposite directions, and a continuously driven belt upon which the containers are moved in a line and in contiguous relation into engagement with said rotary members, said rotary members having alternate closed portions and substantially rectangular apertures formed therein, the closed portions of one rotary member coinciding with the apertures in the other rotary member and arranged to divert successive containers delivered thereto into the apertures of opposed rotary members during rotation thereof, one corner of each closed portion being flattened to form surfaces against which successive foremost containers in the line engage to apply pressure for rotating said members, the opposite corner of each closed portion being wedge shaped and arranged to enter between successive foremost containers to separate them from the line and to guide them into their respective apertures.

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