July 18, 1950 W. H. HARTMANN 2,515,871

AUTOMATIC DIVIDING DEVICE FOR CONVEYER SYSTEMS

Filed Sept. 16, 1948 2 Sheets-Sheet 1

Fig. 1.

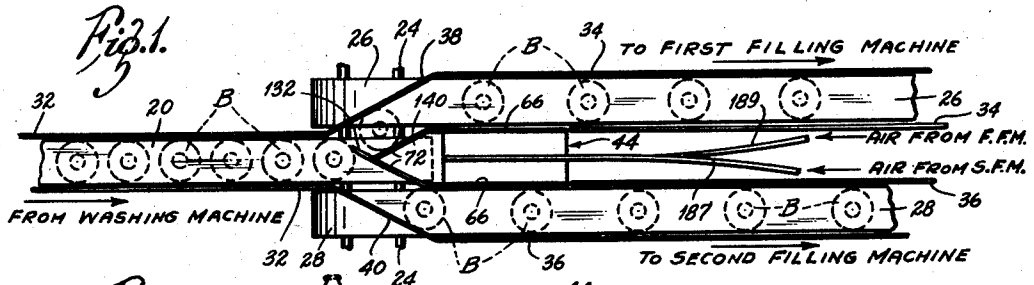


Fig. 2.

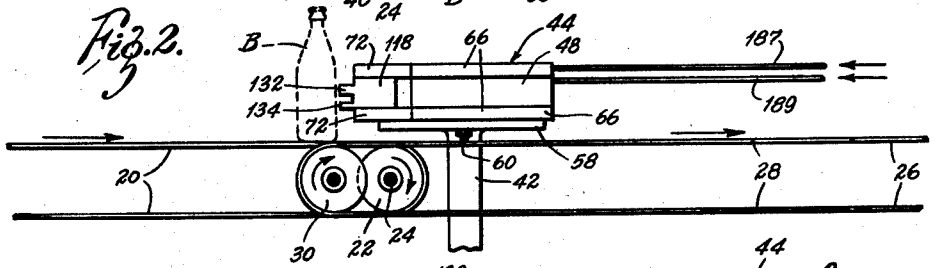


Fig. 3.

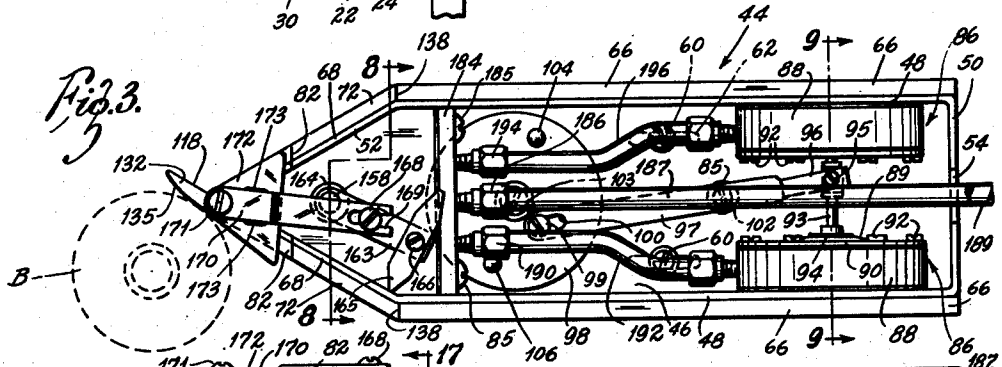


Fig. 4.

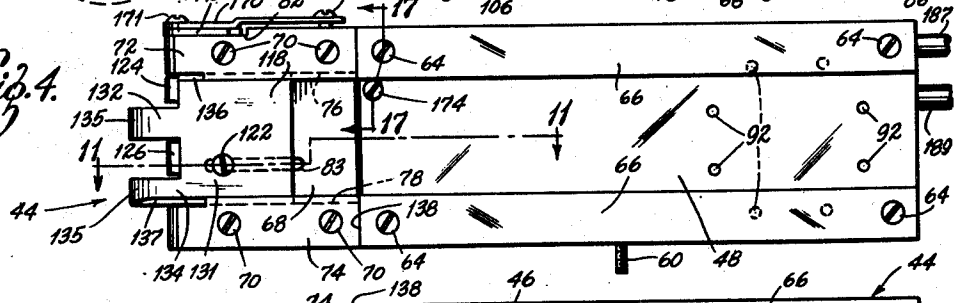


Fig. 5.

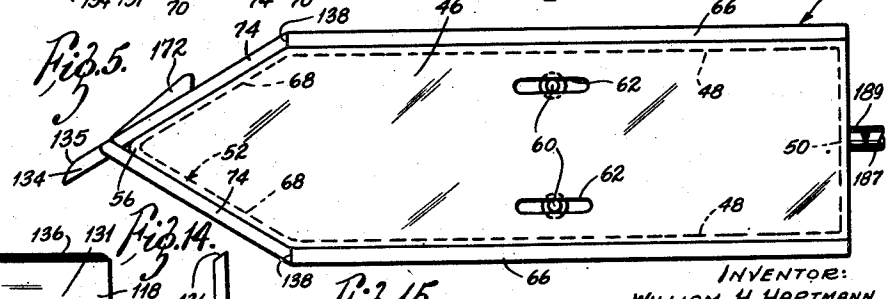


Fig. 13.

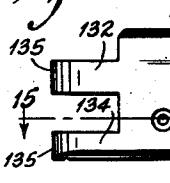


Fig. 14.

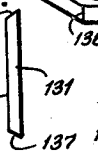
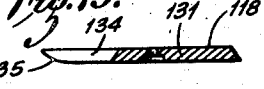


Fig. 15.



INVENTOR:
WILLIAM H. HARTMANN,
BY George J. Mager,
HIS ATTORNEY.

July 18, 1950 W. H. HARTMANN 2,515,871

AUTOMATIC DIVIDING DEVICE FOR CONVEYER SYSTEMS

Filed Sept. 16, 1948 2 Sheets-Sheet 2

Fig. 6.

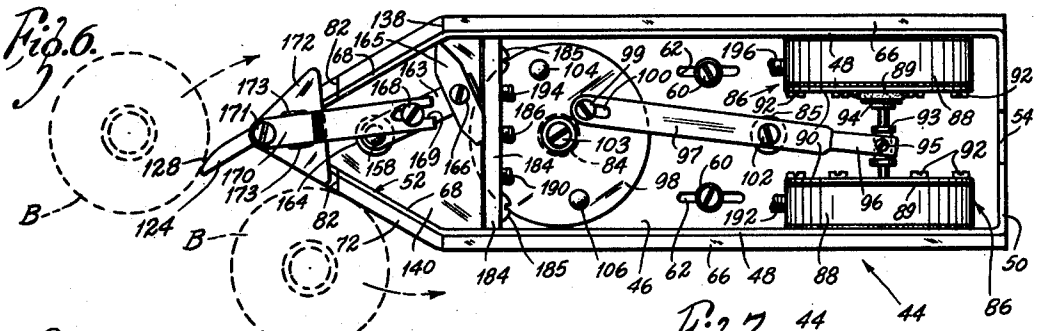


Fig. 7.

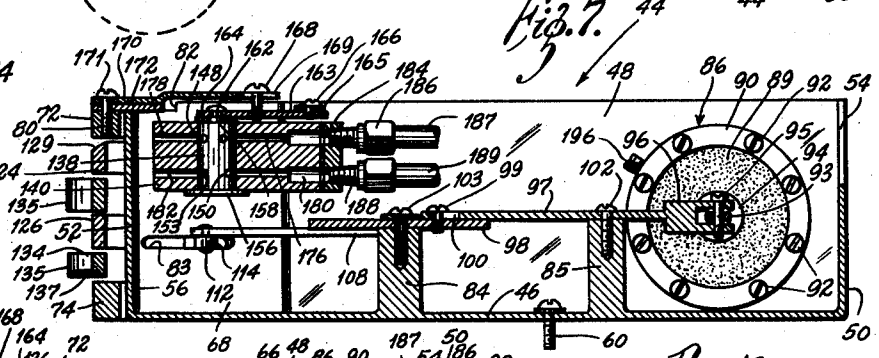


Fig. 16.

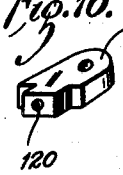


Fig. 8.

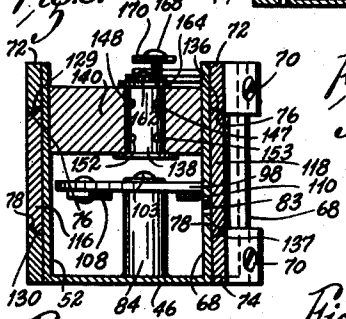


Fig. 9.

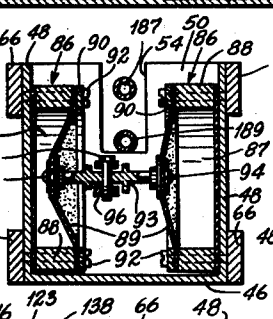


Fig. 10.

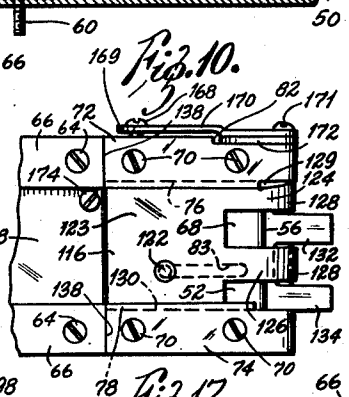


Fig. 12.

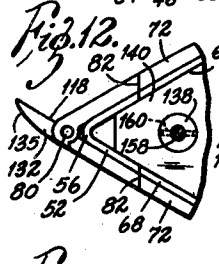


Fig. 11.

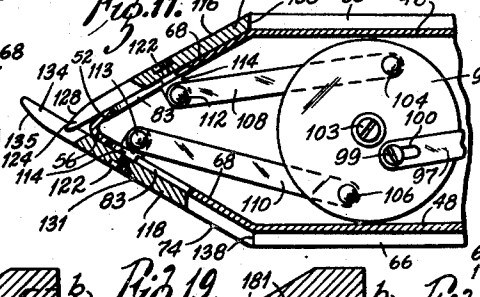


Fig. 17.

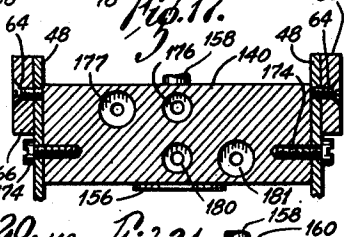


Fig. 18.

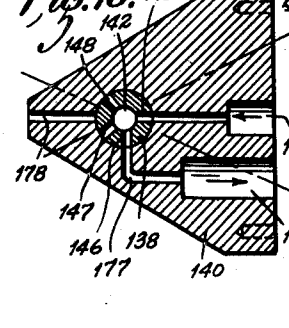


Fig. 19.

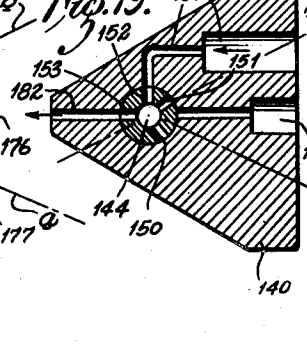


Fig. 20.

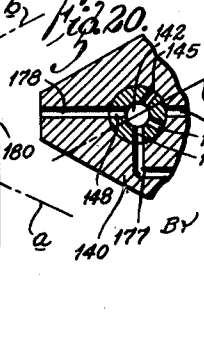
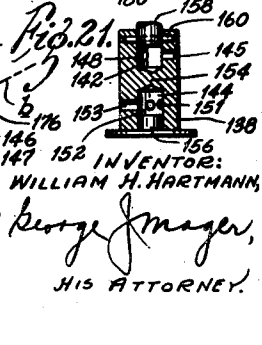


Fig. 21.



INVENTOR:
WILLIAM H. HARTMANN,
BY George J. Mager,
HIS ATTORNEY.

Patented July 18, 1950 2,515,871

UNITED STATES PATENT OFFICE

2,515,871

AUTOMATIC DIVIDING DEVICE FOR CONVEYER SYSTEMS

William H. Hartmann, Lemay, Mo.

Application September 16, 1948, Serial No. 49,511

11 Claims. (Cl. 198—31)

1

The present invention relates generally to an improved device for use with conveyor systems extensively employed in the bottling, canning, and similar industries.

The invention is particularly applicable to that type of conveyor system wherein a single line of bottles, cans, or the like from one machine, is divided into two separate lines to be fed to a pair of other machines.

Primarily, though not exclusively, the invention is designed for incorporation in the conveyor system of a bottling plant.

Such system ordinarily includes a bottle-washing machine, a plate type conveyor leading therefrom to a separation or division point, a pair of bottle-filling machines, and a separate conveyor leading from the point of division to each of the latter machines.

Or, such a system may include a filling machine from which a single line of filled containers may be conveyed to a division point, whence two conveyors may feed, for example, a pair of labeling machines.

In a bottle-washing and filling system, for example, the washing machine normally cleanses the bottles at a rate of speed considerably higher than that at which a filling machine can fill them, so that one washing machine can simultaneously supply bottles for two filling machines. This method of operation in connection with bottles in bottling plants, cans in canning plants, and other containers in analogous industries, is well known.

Heretofore, various types of dividing mechanisms, particularly of the so-called "star wheel" type, have been employed in this connection. The principal disadvantage inherent in these devices is that they necessarily continue the divided feeding of ware to both conveyors, even though because of mechanical failure, one of the pair of recipient machines is temporarily inoperative.

Thus, for example, in a bottling plant, should one of the filling machine require a timing or other adjustment while the system is in operation, it becomes necessary either to shut down the entire system, or to manually remove the bottles from the conveyor feeding the filling machine which is temporarily out of order.

It also frequently happens that in the process of filling the bottles under high pressure, a bottle breaks, resulting in repeated momentary shutdowns of one or the other filling machine, in order to remove the broken glass.

The primary object of the present invention is to provide a divider including means whereby a

2

temporary breakdown or shutdown of one filling machine, automatically halts further feeding of bottles to that machine without interrupting the continued feeding of bottles to the other filling machine.

Another object is to provide divider mechanism whereby each filling machine automatically controls the feeding of ware to that conveyor which is associated with said machine.

A further object of the invention is the provision of a dividing device which in addition to having automatic features, is capable of operating at exceedingly high speeds, intermediate speeds, or low speeds, with equal facility. In other words, the instant device, without requiring adjustment, is adaptable to any conveyor system of the character under consideration.

A feature of the invention resides in the arrangement whereby in normal operation, the leading unit of the single line of ware will cause the dividing mechanism to function.

Another feature resides in the arrangement whereby in non-normal operation, that is when one of the filling machines is not in operation, the leading unit of the single line of ware will be deflected to the conveyor supplying the machine which is in operation.

There are other advantages and features of the invention, in addition to those set forth. These will be apparent or pointed out in the description to follow, reference also being had to the accompanying drawings, which illustrate the invention, by way of example, incorporated in a conveyor system interposed between a bottle-washing machine and two bottle-filling machines.

In said drawings:

Fig. 1 is a diagrammatical illustration in top plan of such a system;

Fig. 2 is a side elevational view of Fig. 1, with guide rail elements omitted;

Fig. 3 is a top plan view of the divider unit comprising the present invention, said unit being shown per se;

Fig. 4 is a side elevational view thereof;

Fig. 5 is a bottom plan view thereof;

Fig. 6 is a view similar to Fig. 3 certain elements of the mechanism being portrayed in alternate position, and others being broken away in the interest of clarity;

Fig. 7 is an approximately central sectional view of the device with the movable elements occupying a position intermediate that shown in Figs. 3 and 6;

Figs. 8 and 9 are vertical sectional views taken

respectively on the lines 8—8 and 9—9 in Fig. 3;

Fig. 10 is a fragmentary side elevational view of the device as it appears from the side opposite that portrayed in Fig. 4;

Fig. 11 is a fragmentary horizontal sectional view taken on line 11—11 of Fig. 4;

Fig. 12 is a fragmentary plan view, certain elements being omitted, and a valve stem being shown in horizontal section;

Fig. 13 is a side elevational view of one of the deflector plates, per se;

Fig. 14 is an end elevational view thereof;

Fig. 15 is a horizontal sectional view thereof taken on line 15—15 of Fig. 13;

Fig. 16 is an isometric view of a slide member;

Fig. 17 is a fragmentary vertical sectional view taken on line 17—17 of Fig. 4, the scale to which the view is drawn being slightly enlarged;

Fig. 18 is a horizontal sectional view through a valve block illustrating particularly a valve and passage arrangement at an upper level in said block;

Fig. 19 is a similar view at a lower level;

Fig. 20 is a fragmentary view similar to Fig. 18 with the valve in an alternate position.

Fig. 21 is a vertical sectional view of the rotary valve per se.

With particular reference now to Figs. 1 and 2, numeral 20 indicates a standard endless conveyor preferably of the plate type, the forward or discharge end of which is defined by a sprocket 22 about the periphery of which the conveyor travels.

The sprocket 22 may be an idler, in which event the conveyor is driven by power means associated with the washing machine; or said sprocket may be driven from any suitable source of power applied to the shaft 24, as is understood.

In either event, conveyor 20 travels forwardly, or to the right in the drawings, as indicated by arrows.

Propelled forwardly in upright position on said conveyor, is a single line of bottles B, indicated in broken lines. The bottles B are suitably spaced as shown, or otherwise, the spacing being dependent upon the delivery speed of the washer, as is understood.

It is noted that, as will appear, the instant device is so designed that it will operate even though the single line of bottles B should actually be in contact with one another as they advance.

Overlapping the end portion of conveyor 20, and adjacent either side thereof, is an endless conveyor which travels in the same direction, and the upper stretch of which is in the same plane, as that of conveyor 20.

The first of these conveyors is designated 26, and leads to a first filling machine; the second of these conveyors is designated 28, and leads to a second filling machine.

The rear end of each of these conveyors travels about a sprocket 30, which may be an idler, or it may be a driven member, as is understood.

Along either margin thereof, conveyor 20 is provided with stationary ware guide rails 32, shown only diagrammatically in plan, in Fig. 1.

The conveyors 26 and 28 respectively also have similar guide rails 34 and 36 along their margins, the inner rails in both instances forming a continuation of guide rails provided on the divider device, as will appear.

An angularly disposed guide rail 38 connects one of the guide rails 32 with the outer rail 34, and a similar rail 40 connects the other rail 32 with outer rail 36.

All of these guide rails are of a width to prevent the bottles from tipping over as they travel along the conveyors, and during the time they are transferred from the single line conveyor 20 to either of the conveyors 26 or 28, as is understood.

The guide rails form no part of the instant invention, any well-known rail construction of this type being suitable.

Removably and adjustably mounted on a standard 42 as shown, or on any other suitable stationary support adjacent the overlapping conveyor end portions, is the divider unit of the present invention. It is generally designated in Figs. 1 through 7 by reference numeral 44.

Included in this device is a substantially rectangular housing or casing comprising a bottom wall 46, side walls 48, a rear end wall 50, and a pointed or tapered forward wall 52. Rear wall 50 is preferably provided with a recess 54, and the apex of forward wall 52 is preferably rounded as at 56, for reasons to appear hereinafter.

The standard 42 diagrammatically illustrated, is representative of any suitable stationary support, or supporting structure, and preferably includes a horizontally disposed top platform portion 58, provided with spaced apertures to receive fastening elements 60 projecting through longitudinal slots 62 formed in the bottom wall 46.

The fastening elements 60 may be screws or bolts, and the elongated slots 62 are provided so that the device 44 may be easily mounted in proper position.

Secured to each side wall 50 by screws 64, as most clearly seen in Fig. 17, are bottle guide rails 66, in alinement with the inner standard guide rails 34 and 36, as shown in Fig. 1.

To each of the converging sides 68 of the forward wall 52, there is secured as by screws 70, an upper rail 72, and a lower rail 74, which constitute forwardly extending continuations of the rails 66.

As seen to best advantage in Fig. 8, each upper rail 72 is beveled, or undercut as at 76, to provide a slideway for a purpose to appear. Similarly, each lower rail 74 is beveled, or undercut, as at 78. At the apex formed by the juncture of the upper rails 72, as shown particularly in Fig. 12, there is provided a threaded aperture 80, and the upper edges of said rails together with the adjacent edges of walls 68 are recessed as at 82.

With particular reference to Figs. 7 and 11, it is seen that each of the converging walls 68 has formed therein an elongated horizontally extending slot 83, and that the bottom wall 46 is provided with a pair of upstanding posts 84 and 85.

Secured to each of the side walls 48, is a diaphragm assembly generally designated 86, and shown in vertical section in Fig. 9. Each of these assemblies includes an air chamber 87, a cylindrical casing 88, a flexible diaphragm 89, a retaining ring 90 for the diaphragm, and a plurality of screws 92 which pass through said elements and engage in the side walls 48 as shown.

A suitable connecting link 93, such as that illustrated, is rigidly secured at either end to one of the diaphragms, as at 94. Pivotally connected to the link 93 centrally thereof as at 95, is the bifurcated end 96 of a lever 97, the opposite end of which is pivotally attached to a rotary disc

98 by means of a screw 99. A longitudinal slot 100 about the screw 99 is provided in the lever 97, the latter is rotatably mounted atop the post 85 by means of a screw 102, and the disc 98 is rotatably mounted atop the post 84 by means of a screw 103.

Attached to the underside of the disc 98, by means of diametrically opposed pivots 104 and 106, are the ends of links 108 and 110 respectively. The forward end of link 108 has a pivotal connection 112 with a block 114, which is slidable in slot 83, and shown per se in Fig. 16. The forward end of link 110 has a similar connection 113 with a second block 114 slidable in the opposite slot 83.

Horizontally reciprocable along each of the converging walls 68, and retained between and slidable along the slideways 76 and 78, is a deflector plate secured to one of the slide blocks 114. Reciprocal motion is imparted to these plates by means of the links 108 and 110, as will appear.

The first of these deflector plates is designated 116, and its movements are regulated by the link 108. The second of these plates is designated 118, and its movements are regulated by the link 110. Each of the slide blocks 114 is provided with a horizontal threaded aperture 120, and each deflector plate is secured to its slide block by means of a screw 122, as shown.

It is noted that the outer vertical faces of the plates 116 and 118 are flush with the outer vertical faces of the rails 72 and 74, so that the bottles, or other ware, passing from conveyor 20 to either conveyor 26 or 28 are in no way hampered by the reciprocation of said plates.

The deflector plate 116 is shown in side elevation in Fig. 10. It includes a main body portion 123, an integral forwardly projecting upper finger 124, and in spaced relation to the latter, a forwardly projecting lower finger 126. The extremities of said fingers are rounded as at 128, as may be best seen in Figs. 6 and 11.

The upper edge of the deflector plate 116 is beveled as at 129, corresponding to the beveled slideway 76 of one rail 72. The lower edge of said plate is beveled as at 130, corresponding to the beveled slideway 78 of one rail 74.

Deflector plate 118 which has general characteristics similar to plate 116, is illustrated in detail in Figs. 13, 14, and 15. It also includes a main body portion designated 131, an integral forwardly projecting upper finger 132, and in spaced relation thereto, a forwardly projecting lower finger 134. The extremity of each said finger is rounded as at 135, as appears especially in Figs. 3, 11, and 12.

The rounded ends 128 of the fingers 124 and 126, and the rounded ends 135 of the fingers 132 and 134, are provided primarily for easy insertion between the leading unit and the next adjacent unit of the single line, when these bottles are in contact.

The upper edge of deflector plate 118 is beveled as at 136 to slidably engage the beveled slideway 76 of the other rail 72. The lower edge of said plate is beveled as at 137 to slidably engage the beveled portion 78 of the other rail 74.

As illustrated in the drawings, the spacing of the finger members is such that those integral with deflector 116 may freely traverse those integral with deflector 118, as said deflectors are reciprocated.

The novel means whereby the divider, or ware

deflector plates 116 and 118 are caused to intermittently and alternately travel forwardly and rearwardly respectively, will now be described.

This much should be obvious from the foregoing description, that if disc 98 is caused to rotate clockwise, as viewed in Fig. 11, the deflector plate 116 will travel rearwardly until its rear edge abuts the forward vertical edges 138 of rails 66, and that simultaneously deflector plate 118 will travel forwardly a tantamount distance, or vice versa.

The alternating clockwise and counter-clockwise motion of disc 98 is regulated by lever 97, activated by the diaphragm assemblies 86. In other words, with particular reference to Fig. 9, when the connection 93 is caused to move to the left, the deflector plates 116 and 118 will be moved to the position they occupy in Fig. 11.

Conversely, when connecting member 93 is caused to move to the right, the position of said plates will be reversed, as is understood, and as may be clarified by a comparison of Figs. 3 and 6.

The diaphragm assemblies 86 are operable by means of compressed air supplied by the compressed air systems which control the functioning of the filling machines, as will appear.

The delivery of air power to one of the diaphragm assemblies while the other is simultaneously exhausting, is governed by the movements of a rotary valve 138 in association with a valve block 140 which supports it.

As seen to best advantage in Figs. 7, 8, and 18 through 21, the valve 138 has formed therein a series of radial ports leading from a common air chamber 142 on an upper level, and a series of radial ports leading from a similar chamber 144 on a lower level.

Thus, at the upper level, an air pressure inlet port 145, an air outlet port 146, an exhaust inlet port 147, and an exhaust outlet port 148 are in communication with chamber 142. At the lower level, an air pressure inlet port 150, an air outlet port 151, an exhaust inlet port 152, and an exhaust outlet port 153 are in communication with chamber 144.

As illustrated in Fig. 21, the chambers are separated by a solid wall 154. A flanged plug 156 has a press fit in the valve body to define the bottom wall of chamber 144, and the top wall of chamber 142 is defined by a valve stem 158 which may be secured to the valve body by a pin 160, as shown, or otherwise.

Valve stem 158 extends upwardly beyond the top face of valve 138 to terminate in a squared portion 162 for rigidly affixing thereto a horizontally rotatable arm 163, as particularly shown in Figs. 7 and 8. For smooth operation, a washer 164 may be interposed between the underside of arm 163 and the top face of the valve, said washer also extending beyond the valve body on the surface of the valve block 140.

It is noted that said arm is located in a plane below the top edge of the housing, so that its rotary movements are limited, as will appear, by a cross bar 165 rigidly secured to its free end by a screw 166 or the like.

Intermediate the valve stem 158 and cross bar 165, arm 163 carries a screw 168 which extends upwardly through the bifurcated free end portion 169 of a horizontally disposed arm 170. The opposite end of arm 170 is pivotally mounted by means of a screw 171 which engages the aperture 80 in guide member 72. A substantially triangular plate 172 is rigid with arm 170, being pref-

erably welded thereto as suggested at 173 in Fig. 6.

The valve block 140 is of substantially triangular configuration in plan, so as to snugly fit within the housing at the tapered end thereof. As shown particularly in Fig. 17, said block is rigidly maintained in place by screws 174 passing through the side walls 48 to engage in threaded apertures provided therefor in the block.

Valve block 140, as may be observed in Figs. 7, and 17 through 20, has formed therein three passageways in the plane of the upper level ports, and three passageways in the plane of the lower level ports, of valve 138.

At the upper level, there is an air pressure inlet 176, an outlet 177, and an exhaust passageway 178. As will appear however, the passage 177 serves also in an exhaust capacity.

At the lower level, there is an air pressure inlet 180, an outlet 181, and an exhaust passageway 182. Passage 181 likewise serves also in an exhaust capacity.

A cover plate 184 is provided for the block, being secured in place by screws 185. The cover plate is provided with four threaded apertures in alinement respectively with the openings 176, 177, 180, and 181, the arrangement being evident from an inspection of Fig. 7.

The threaded aperture opposite passageway 176, receives a fitting 186 on the end of a flexible air conduit 187 leading from one filling machine, that opposite passageway 180, a fitting 188 on the end of a similar conduit 189 leading from the other filling machine.

The threaded aperture opposite opening 177 receives a fitting 190 at one end of a conduit 192, the other end of which communicates with the right hand diaphragm assembly 86 of Fig. 9.

The threaded aperture opposite opening 181 receives a fitting 194 at one end of a conduit 196, the other end of which communicates with the left hand diaphragm assembly 86 of Fig. 9.

From the foregoing, it should be apparent that the invention provides a compact divider unit which may be easily and quickly incorporated in a conveyor system of the type under consideration. Wall 50 is recessed to accommodate the conduits 187 and 189. The rounded apex 56 of the housing permits smooth reciprocation of the plates 116 and 118.

Operation

In describing the operation of the device, it will be assumed, with particular reference to the diagrams of Figs. 1 and 2, that conveyor 20 is being driven from a power source at the washing machine, and that conveyors 26 and 28 are being driven from the filling machines.

It will further be assumed that the filling machine conveyors travel at the same rate of speed relative one another, and relative that of conveyor 20, although this is not critical in the latter respect, as is understood.

It will be assumed also, that both filling machines are in continuous operation and that the performance of each is controlled by a separate compressed air system, so that should either of them require a temporary shutdown, the air power supplied to that particular machine may be cut off without affecting the other machine.

In other words, the first filling machine is controlled by a compressed air system which includes the conduit 189, so that air pressure is supplied to passageway 180 as long as said machine is in operation.

Conversely, the second filling machine is controlled by a compressed air system which includes conduit 187, so that air pressure is supplied to passageway 176 as long as the second machine is in operation.

Thus, as will be explained, the right hand diaphragm 89 may be activated to the position it occupies in Fig. 9 by compressed air from the conduit 187, whereas the left hand diaphragm 89 may be activated to a position opposite that it occupies in Fig. 9, by compressed air from conduit 189.

Assuming now for example, that a single line of bottles on conveyor 20 is approaching the divider 44, and that deflector plate 118 is in the operative position illustrated in Figs. 3 and 4, the leading bottle B will be diverted toward conveyor 28, by the curved ends 135 of finger members 132 and 134. Valve 138 at this time, is in the position illustrated in Figs. 18 and 19. Consequently, air pressure from the second filling machine, passing through the passage 176 and inlet port 145 into chamber 142, thence through outlet port 146, opening 177, and conduit 192 to right hand chamber 87, flexes adjacent diaphragm 89 to the left, as in Fig. 9. Said diaphragm will be so maintained as long as valve 138 is not caused to rotate.

Obviously, as the diaphragm moves to the left, the connecting link 93 moves with it, whereby arm 97 causes the disc 98 to rotate clockwise as viewed in Figs. 3 and 11. Simultaneously, arm 110 moves forwardly to slide deflector plate 118 to the position shown, slide block 114 operating in slot 83. It is manifest therefore from the above, that the plate 118 will be maintained in this position as long as the position of valve 138 remains unchanged.

Intermittent partial rotation of said valve is effected by successive bottles B in conjunction with the triangular control plate 172, which in normal operation, is caused to oscillate about pivot 171 from its Fig. 3 to its Fig. 6 position, and vice versa.

In other words, as leading bottle B rides along the vertical faces of the deflector plate 118 and its guideways 72 and 74, it strikes the adjacent laterally projecting edge of control plate 172, and thereby causes said plate to oscillate from its Fig. 3 to its Fig. 6 position.

Since arm 170 is rigid with the control plate, movements of the latter are transmitted to valve stem 158 via the arm 163 and pivotal connection 168, as is manifest. In other words, an instant after bottle B has been deflected, valve 138 is rotated from its Fig. 18 to its Fig. 20 position. Over-travel of the valve control elements in either direction is prevented by the cross bar 165.

Instantaneously after the valve change, the deflector plate 118 is withdrawn from, and deflector plate 116 is projected into, the path of the oncoming single line of bottles, as illustrated in Fig. 6. Thus, the next bottle, which has now become the leading bottle of the single line, is deflected toward conveyor 26 by the rounded ends 128 of fingers 124 and 126. Immediately thereafter, this bottle contacts the projecting edge of control plate 172, to return the valve 138 to its Fig. 18 position.

It should be evident, that since the valve changeover requires but an instant, the speed with which the deflector plates may be reciprocated is limited only by the speed of the conveyors.

It should also be evident, that in normal oper-

ation, the valve 138 alternately causes the air supply from the first filling machine to operate the left hand diaphragm 89, and thereupon causes the air supply from the second filling machine to operate the right hand diaphragm, as viewed in Fig. 9.

Consequently, because the link 93 connects both diaphragms, the latter move in unison in either direction, so that as the power enters one chamber 87, the air in the other such chamber is exhausted.

Thus with the valve in the Figs. 18 and 19 position, at which time the right hand diaphragm 89 is flexed to the left, left hand diaphragm chamber 87 is exhausted via conduit 196, passageway 181, radial port 152, chamber 144, radial port 153, and opening 182 to atmosphere. The dot and dash line *a* in these views respresents the longitudinal center line of arm 163 in its Fig. 3 position; the dot and dash line *b* represents the same centerline with said arm in its Fig. 6 position.

In Fig. 20, the upper level of the valve is shown in the *b* position. At such time, compressed air from the first filling machine via conduit 189, passing through opening 180 and inlet port 150 into lower chamber 144, thence through outlet port 151, passageway 181, and conduit 196 to left hand chamber 87, flexes adjacent diaphragm 89 to the right.

Simultaneously, right hand chamber 87 is exhausting via conduit 192, passageway 177, radial port 147, upper chamber 142, exhaust port 148, and opening 178 to atmosphere.

An important feature of the invention, as pointed out earlier, is that the breakdown or shutdown of one of the filling machines, will not affect the continued operation of the other. In other words, assuming that the first filling machine requires an adjustment, the compressed air supply is cut off, so that pressure no longer is available to shift link 93 to the right.

As a result, deflector plates 116 and 118 remain stationary in the Fig. 11 position, so that for the time being, all bottles from conveyor 20 are diverted to conveyor 28. Just as soon as the adjustments have been made, and the air supply is turned on at the first filling machine, the deflector plates 116 and 118 automatically resume their intermittent reciprocation.

From the foregoing, it is evident that this invention provides a dividing device that is not only novel, but also highly efficient. It should likewise be apparent that the device may be incorporated in standard conveyor systems without requiring any structural changes therein.

While the invention is illustrated, and has been described primarily in the role of a dividing device, it should be evident that with a slight change in the contour of the control plate 172, and a reversal in direction of the conveyors, the device may likewise be employed to divert bottles from a pair of lines, to a single line.

It should also be apparent, that the invention is operable also by suction, it being only necessary to reverse the linkage 163, 168 and 170, relative the valve.

In other words, with the valve 138 in the position shown in Figs. 18 and 19, arm 163 would be on line *b* rather than on line *a*, if suction were the operating medium.

It is also to be understood, that the precise details illustrated and described, may be modified without departing from the broad concepts

of the invention, which is to be limited only by the appended claims.

What is claimed is:

1. A device for automatically dividing a single line of ware on one conveyor into two separate lines on a pair of adjacent conveyors, said device including a pair of deflector plates reciprocable intermittently across the path of the leading unit in said single line, a rotary valve the position of which is intermittently reversed by successive leading units of said single line, a valve block for rotatably supporting said valve, a series of passageways formed in said block, a first air supply line in communication with one of said passageways, a second air supply line in communication with another of said passageways, a first diaphragm assembly, conduit means in communication at one end with another of said passageways and at the opposite end with an air chamber included in said assembly, a second diaphragm assembly, conduit means in communication at one end with another of said passageways and at the opposite end with an air chamber included in said second assembly, and means operable by said diaphragm assemblies for intermittently reciprocating the deflector plates aforesaid.

2. The device of claim 1 wherein each of the intermittently reciprocable deflector plates is provided with an upper and a lower beveled edge in slidable engagement respectively with a similar complementary portion of an upper and a lower rail member secured to a casing incorporating said device, and wherein each deflector plate includes a pair of integral spaced projecting finger members each provided with a rounded extremity adapted to be intermittently reciprocated across the centerline of said first conveyor, and across one another.

3. The device of claim 1 wherein the rotary valve comprises a cylindrical body portion, an upper and a lower air chamber separated by a solid wall formed therein, a valve stem rigid with said body and defining the top wall of said upper chamber, a plug member defining the bottom wall of said lower chamber, a series of four radial ports each in communication with said upper chamber, a series of four radial ports each in communication with said lower chamber, and wherein said valve stem terminates in a squared portion for rigidly affixing thereto a horizontally rotatable arm provided with a crossbar for limiting the rotary movement in either direction of said valve.

4. The device of claim 1 wherein the block for rotatably supporting said rotary valve includes a substantially triangular body portion, a vertical circular opening therethrough to accommodate the valve, a series of three passageways in the plane of the upper level ports and a series of three passageways in the plane of the lower level ports of the valve, a cover plate provided with two threaded openings at an upper and two similar openings at a lower level, means for removably securing said plate to said block.

5. The device of claim 1 wherein the means operable by said diaphragm assemblies for intermittently reciprocating the deflector plates includes a connecting link between said diaphragms, an arm pivotally mounted intermediate its ends one of which has a pivotal connection with said link, and the other of which has a similar connection with a rotary disc, an elongated slot in said arm about the last-named pivotal connection, a support for rotatably

mounting said disc, a pair of links each having one of its ends secured to said disc by a pivot, said pivots being diametrically opposed, and each of said links having its opposite end pivotally attached to a slide block rigidly secured to one of said plates.

6. The device of claim 1 wherein each deflector plate includes a main body portion provided with a countersunk aperture and a beveled upper and lower marginal edge, a forwardly projecting upper finger integral therewith, and a forwardly projecting lower finger integral therewith and in spaced relation to said upper finger, the extremities of each of said fingers being rounded, and the countersunk aperture being adapted to receive the head portion of a screw the shank portion of which is in engagement with a reciprocal slide block operating in a horizontal slot formed in the wall of a casing included in the device.

7. In a divider of the character described, a rotary valve and means whereby intermittent partial rotation of said valve is effected by a unit of ware, said means including a substantially triangular control plate, a pivotal mounting therefor, a first oscillable arm rigid with said plate, a second oscillable arm rigidly secured to the upper stem end of the valve, and a vertically disposed element rigid with the second arm and in engagement with the bifurcated free end of the first arm.

8. The mechanism of claim 7 and means whereby the extent of intermittent partial rotation in either direction is limited, said means comprising a crossbar rigidly attached to said second arm at the free end thereof, and adapted to strike against one or the other of a pair of walls included in a casing wherein said mechanism is mounted.

9. A divider unit for incorporation in a conveyor system of the type described, said unit including a substantially rectangular casing having a bottom wall, side walls, a rear end wall, and a pointed forward wall; a rounded apex on said forward wall; a recess in said rear end wall; a rotary valve and means for partially rotating said valve; a valve block for rotatably supporting the valve and having inlet and outlet air openings adapted to be brought into registry with radial ports in said valve; a pair of air supply lines each leading from a remote source to said

block, a pair of diaphragm assemblies mounted in opposed relation on the side walls of said casing internally thereof; and an air line leading from said block to each of said diaphragm assemblies.

10. In combination with a conveyor system of the character described, a device operable by successive containers to divide a single line into two separate lines of containers, said device including a pair of angularly disposed deflector plates reciprocable across the path of the single line, linkage controlled by a rotary disc for intermittently reciprocating said plates, a pivoted arm for oscillating said disc under the action of a pair of diaphragm assemblies, and means including a valve and air supply lines for governing the action of said assemblies.

11. In a device of the character described, a pair of opposed diaphragm assemblies for intermittently reciprocating a pair of slidably mounted deflector plates, each assembly including an annular housing providing an air chamber, a flexible diaphragm and a retaining ring therefor, an opening serving alternately as an intake and exhaust for the air chamber, and a transverse connecting link rigidly attached at either end to one of said diaphragms, said link having a pivotal connection with one end of an oscillable arm for activating mechanism controlling the movements of the deflector plates aforesaid.

WILLIAM H. HARTMANN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,516,979	Nilson	Nov. 25, 1924
1,760,902	Gratton	June 3, 1930
1,898,662	Herold	Feb. 21, 1933
2,168,191	Bergmann	Aug. 1, 1939
2,363,189	Magnusson	Nov. 21, 1944
2,371,419	Bergmann	Mar. 13, 1945

FOREIGN PATENTS

Number	Country	Date
818,058	France	Sept. 17, 1937