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W. H. GREENAMYER
ARTICLE SEGREGATING MECHANISM

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3 Sheets-Sheet 1

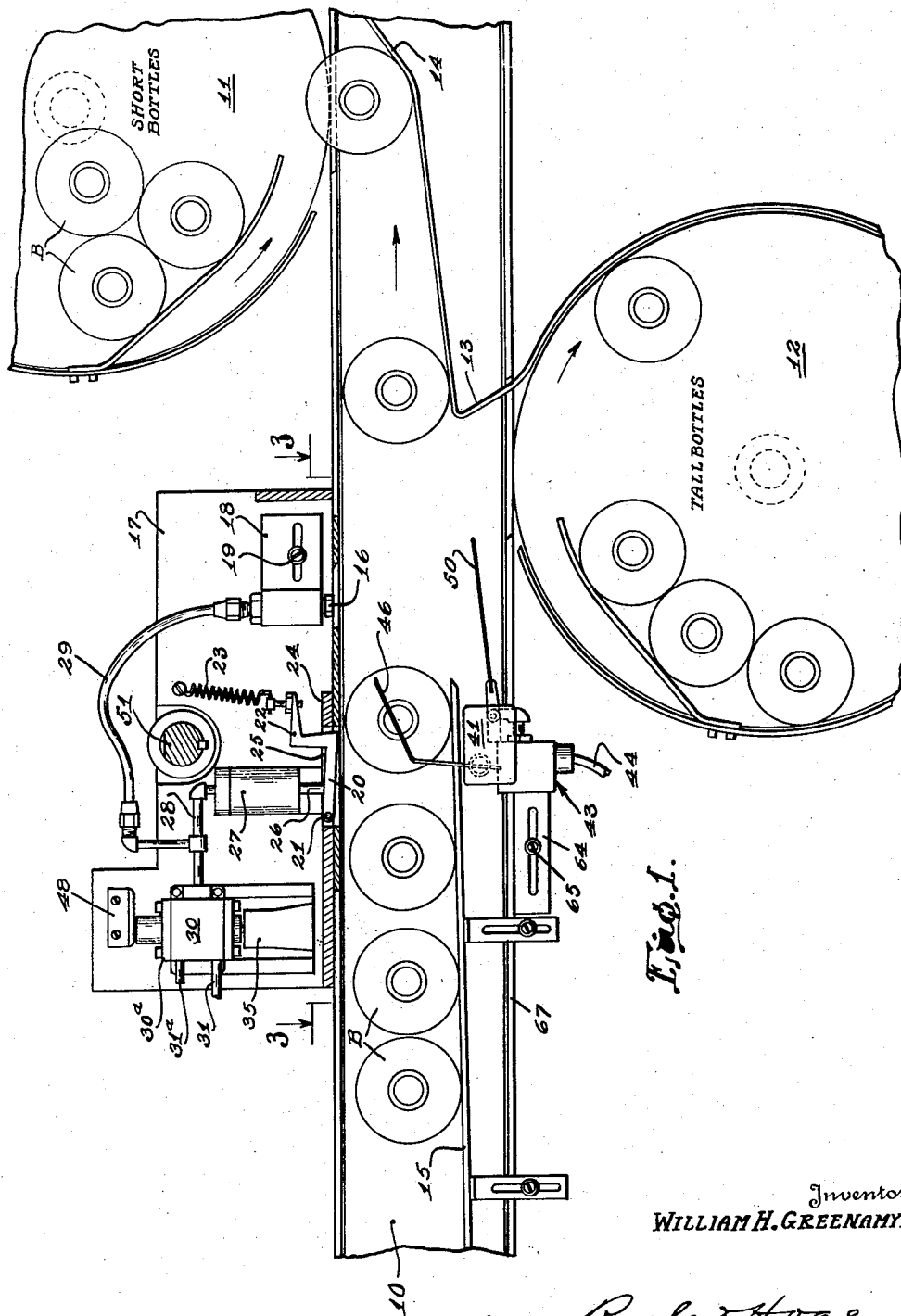


Fig. 1.

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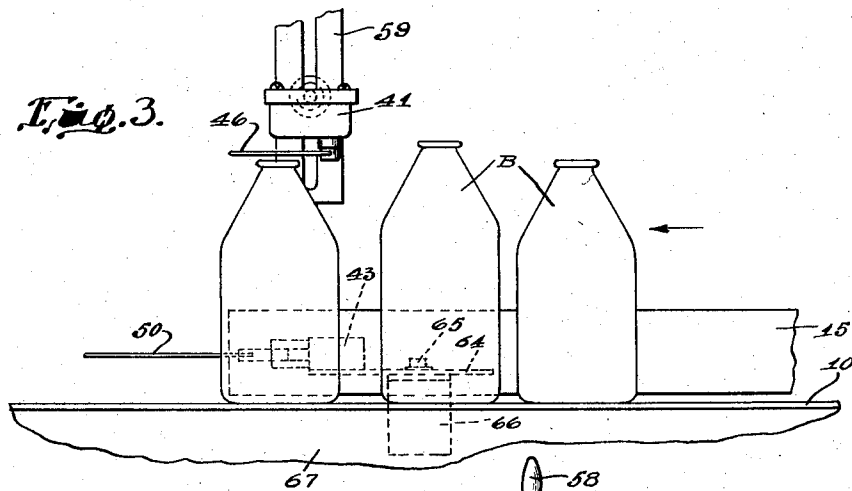
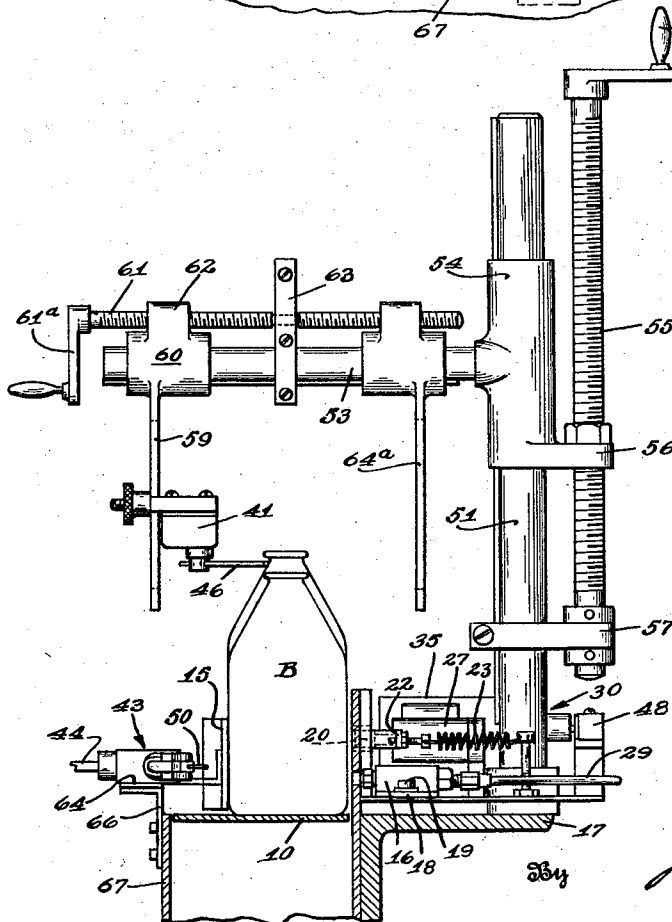
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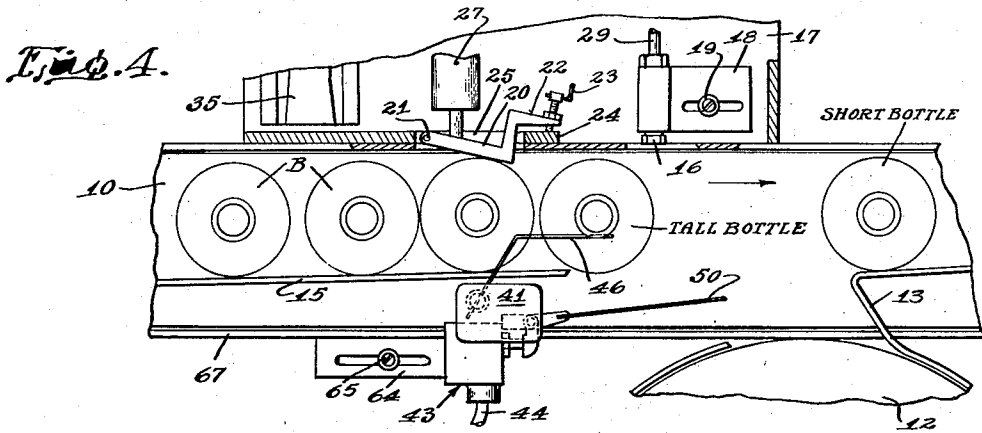
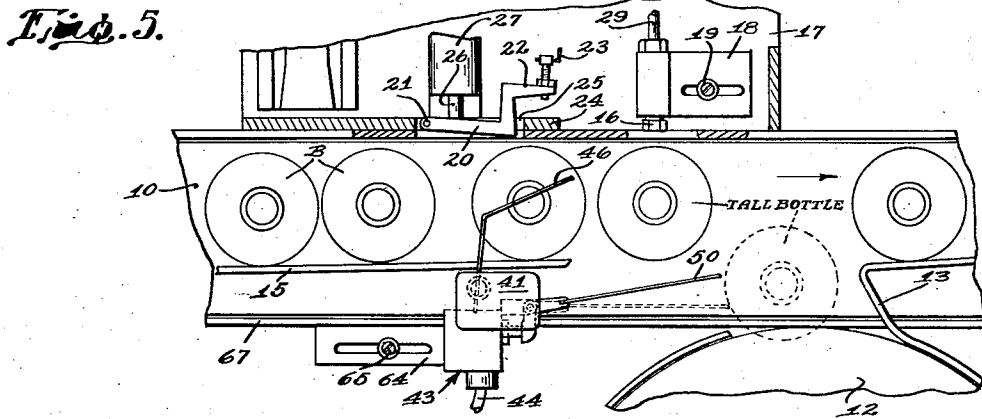
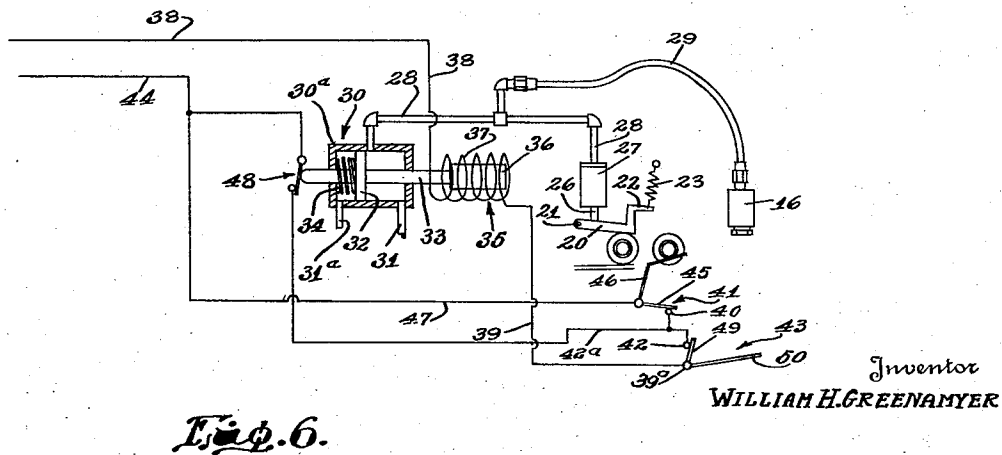
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ARTICLE SEGREGATING MECHANISM

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3 Claims. (Cl. 209—82)

The present invention is an apparatus for segregating articles as determined by differences in size or external surface contour, such as height, diameter and specific configuration.

Although the invention has other fields of application, I have illustrated same in association with a conveyor which carries bottles, or jars in upright position, and in single file, from the discharge end of an annealing Lehr (not shown) to packing tables, or accumulator tables; sometimes referred to as unscramblers.

In the manufacture of bottles and jars, it is not uncommon to simultaneously anneal two, or more kinds of bottles, or jars in the same Lehr. Frequently these articles differ from each other only with respect to height, or possibly diameter of the body, shoulder, or neck portions. In some instances the distinction may reside only in the surface decoration which may be molded in the article, or perhaps applied by a stencil operation. On the other hand such differences may be only in the bottom portion.

It is distinctly advantageous and obviously greatly facilitates handling and packing, to group the bottles or jars according to specific size or other distinction, prior to reaching the packing station, in that it materially aids the packer in performing his job. Heretofore such were separation or segregation has been effected manually by the operators, or ware selectors.

An object of my invention is the provision of segregating mechanism arranged beside a horizontal bottle conveyor and of such character that its operation is initiated by the bottles, or other articles, themselves. Thus, all bottles, or such articles, of a given size, surface configuration, etc., will as they reach a predetermined point in the segregating zone, actuate the mechanism which bodily moves such articles away from the normal line or path of travel, for automatic placement upon an unscrambler, or accumulator table, or the like.

Another object is the provision in apparatus of the above character of simple means for adjusting same as required by differences in the size of articles involved.

Other objects will be in part apparent and in part pointed out hereinafter.

In the drawings:

Fig. 1 is a sectional plan view, showing my apparatus as utilized in segregating bottles of one height;

Fig. 2 is a cross-sectional view illustrating the adjusting mechanism;

Fig. 3 is a fragmentary side elevational view taken substantially at the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional plan view showing a tall bottle actuating a micro-switch to initiate operation of the mechanism;

Fig. 5 is a view similar to Fig. 4, but shows the tall bottle in full lines, about to be moved across the conveyor and in dotted lines in contact with a circuit breaking micro-switch; and

Fig. 6 is a wiring diagram schematically showing the parts controlled thereby.

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In its broadest aspects my apparatus comprises electrical means actuated by a bottle, or other article of predetermined size, height or configuration moving along a horizontal path, such means in turn functioning to arrest forward travel of the articles following that which actuated the electrical means, until a deflector, also controlled by said means has removed said article from the normal path of travel.

As illustrated in the accompanying drawings, my apparatus is utilized in conjunction with a horizontal continuously moving conveyor 10, which carries bottles generally designated by the letter B in upright position and in single file from an annealing Lehr (not shown) to unscramblers, or accumulator tables, one such table 11 (Fig. 1) adapted to receive short bottles and the other table 12 intended to receive tall bottles, in the herein disclosed arrangement. The packers manually remove the bottles, or such articles, from these tables for placement in shipping cartons. The obvious advantage of having bottles of one kind, for a specific customer, segregated from all others, is readily appreciated.

The conveyor 10 is of substantially greater width than the diameter of the largest bottles it will carry so that they may travel in single file along one marginal section, or area, of the conveyor through the segregating zone, and provide a second marginal section or area to accommodate segregated bottles which may then be directed by a deflector 13 onto the table 12. The remaining bottles continue along the conveyor until they are removed laterally therefrom by a deflector 14 to the table 11.

As the bottles approach and enter the segregating zone, they are gradually moved laterally toward one margin of the conveyor by a laterally adjustable guide rail 15. Thus the bottles are properly positioned both for straight-line movement toward the point of transfer to the table 11 and to actuate the segregating means to be described.

This segregating means comprises an air nozzle 16 carried by a bracket 17 and positioned to direct a stream of air under pressure across the path of travel of the bottles a short distance in advance of the deflector 13 which guides bottles to the table 12. This nozzle is adjustable along the conveyor by means of a slotted flange 18 and screw 19 which secure same to the bracket 17. Thus the position of this nozzle in relation to the table 12 and associated mechanism may be easily adjusted as operating conditions require. This air nozzle operates intermittently to effect lateral movement of bottles of predetermined height transversely of the conveyor to such position that they move along a different path than that traveled by the other bottles and as stated above, they may be deflected onto the table 12. During the short interval of time required to move a bottle laterally, the forward travel of succeeding bottles is arrested momentarily. Such is obtained by means of a gate 20.

This gate (Fig. 1) is pivoted at one end to a vertical hinge pin 21 and at its free end has a finger 22 adjustably connected to a coil spring 23. This spring is anchored to the bracket 17 and normally holds the gate 20 flush with the vertical wall 24 of the bracket 17, such wall having an opening 25 to accommodate said gate. Projection of this gate into the path of the bottles to clamp the lead bottle between said gate and the forward end portion of the guide 15 is obtained, by means of a rod 26 carried and actuated by an air cylinder 27.

This air cylinder includes a piston (not shown) connected to the rod 26 so that air under pressure entering the cylinder through the line 28 moves said piston and projects the rod to thereby swing the gate inwardly over the conveyor, (see Fig. 4). The spring 23 not only returns the gate to its normal position, but also returns the piston to its initial position.

Both the gate operating cylinder 27 (Fig. 6) and the aforementioned air nozzle 16 which has a flexible pipe 29 connected to the line 28, are operated under the control of a three-way air valve 30. This valve 30 (Figs. 1 and 6) includes a housing, or cylinder 30a, to an intermediate point of which the air line 28 is connected. An air supply line, or pipe 31 is connected to one end of the cylinder and an exhaust pipe 31a is provided at the other end. A disk 32 carried by a rod 33 is mounted in the cylinder. This rod extends through both ends of the cylinder and at one side of the disk 32 carries a coil expansion spring 34 which normally positions the disk to establish communication between the exhaust line and the pipe 28 which leads to the air nozzle and gate operating cylinder. In its other position the disk permits flow of air under pressure from the supply line, or pipe 31, to the pipes 28 and 29. An electrical solenoid 35 operates to move the valve disk in opposition to the spring 34.

As explained briefly heretofore, the bottles carried by the conveyor 10 initiate and control operation of the segregating mechanism. To this end there is provided an electrical system directly controlled by the bottles and in turn functioning to operate said three-way valve in such fashion that when a tall bottle enters the segregating zone, it closes a circuit, energizes the solenoid and opens said valve. Thus, air flows to the gate operating cylinder and nozzle and arrests succeeding bottles while the tall bottle is moved laterally by means of a stream of air under pressure directed by said nozzle. Movement of this tall bottle transversely of the conveyor a predetermined distance brings it into engagement with and opens a switch to thereby open the circuit and reset the mechanism.

This electrical system includes the aforementioned solenoid 35, comprising an armature 36 connected to one end of the valve rod 33 and a coil 37, one end of which is connected to a conductor 38. The other end of this coil is connected by a conductor 39 to one contact 39a of a normally closed breaker switch 43, the latter also connected at a contact 42 to a conductor 42a leading to a normally open delay micro-switch 48 and thence to a main current conductor 44.

A micro-switch 41 (Fig. 6) is connected to the conductor 42a and includes a pivoted switch blade 45 and a feeler arm 46, the latter intended to be positioned so that it will be contacted only by bottles of a given minimum height. This switch blade 45 is also connected to a conductor 47 leading to the main current conductor 44 just mentioned. The time delay micro-switch 48 is positioned to be closed by opening of the three-way valve 30, in that the rod 33 of the latter extends beyond the valve cylinder for this purpose. Thus, when the solenoid is energized by closing of the micro-switch 41, the three-way valve is opened and the normally open time delay micro-switch 48 is closed.

The breaker switch 43, which normally is closed, comprises in addition to the contact 42, a pivoted switch blade 49 and a feeler arm 50 which segregated bottles strike and actuate to open the circuit, incident to lateral movement of such bottles across the conveyor. Thus the mechanism is reset for a succeeding operation.

Briefly, in review, the operation is as follows: bottles move in single file along the conveyor and as they approach the segregating mechanism, are gradually shifted laterally by the guide rail 15 to bring them to a line of travel which will insure their movement in close proximity to the gate 20 and air nozzle 16. A tall bottle entering the segregating zone and passing the gate 20 strikes the feeler arm 46 of the normally open micro-switch 41 and closes the latter. Since the breaker switch 43 is normally closed, the circuit is completed incident to closing of the micro-switch 41 and the solenoid 35 is energized. The three-way valve immediately opens to permit flow of air under pressure to the air nozzle 16

and cylinder 27 to thereby project the gate into the path of succeeding bottles, clamping the lead bottle against the guide rail and arresting forward travel of all bottles following the tall bottle, which has just closed the micro-switch 41. This tall bottle quickly moves into the path of the stream of air from the air nozzle. This stream of air moves the bottle across the conveyor into contact with the feeler arm of the normally closed breaker switch, thereby again opening the circuit.

The time delay micro-switch 48, as explained heretofore, is closed incident to opening of the three-way valve 30. Reopening of this switch follows opening of the breaker or re-set switch 43, such occurring after interval of time the duration of which is determined by the closing of the three-way valve under influence of the coil spring 23 following de-energization of the solenoid. Such time interval is sufficient to permit complete removal of the segregated tall bottle from the normal path of travel of the other bottles. As stated before, these segregated bottles may be directed to the table 12 by means of the deflector 13, or may be disposed of in some other fashion.

In Figs. 1 and 2 I have illustrated adjustable supporting means for the micro-switch which is actuated by the bottles to initiate operation of the segregating mechanism. This includes a vertical post 51 rising from the bracket 17. A horizontal arm 53 extending across and above the conveyor is carried by a sleeve 54 which is splined to said post. An adjusting rod 55 is threaded through a flange 56 on said sleeve and rotatably secured at its lower end in a stationary bracket 57. A handle 58 at the upper end of the adjusting rod 55 is utilized to rotate the rod and thereby adjust the arm 53 vertically as determined by the necessary operating position of the micro-switch 41.

This micro-switch 41 is also vertically adjustable on a depending finger 59 which is carried by a sleeve 60 mounted upon the arm 53. A screw rod 61 is threaded through a flange 62 on said sleeve 60 and threaded through a fixed bracket 63 on the arm 53. A handle 61a on this screw rod permits horizontal adjustment of the micro-switch 41 so as to accurately position same with respect to that part of the bottle intended to contact the feeler arm 46.

I have also shown a second depending finger 64a similar as to mounting and adjustment, to the other finger 59, and upon which can be mounted a micro-switch similar to the other micro-switch 41, but carrying a feeler arm which would be contacted by the body portion of a bottle of relatively large body or neck diameter. In such event, the micro-switch 41 shown would be dispensed with and a similar, but differently, located micro-switch utilized. The electrical circuit would remain unchanged.

Adjustment of the breaker switch 43 longitudinally of the conveyor in relation to the micro-switch 41 and deflector 13 is obtained by mounting the switch upon a bracket 64a which has a screw and slot connection 65 to a support 66 carried by the conveyor support 67.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. Apparatus for segregating bottles and like articles according to predetermined differences in their external surface configuration, comprising, a horizontal continuously moving conveyor for carrying bottles seriatim and in an upright position into and through a segregating zone, segregating means in said zone comprising, means for supplying air under pressure, an air flow control valve connected to the air pressure supply means, a solenoid for opening said valve, a movable gate for retarding movements of bottles in said zone, an air operated device connected to said valve for moving said gate, an air nozzle connected to the valve and positioned rearwardly of the gate to direct a stream of air

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across the path of travel of the bottles for moving selected bottles out of said path of travel, means for energizing the solenoid including an electrical circuit, a normally closed switch openable by contact with bottles moved out of said path of travel, a normally open switch closable by bottles moving along said path and which are to be segregated from the others to thereby energize the solenoid, and a time delay switch closable incident to and by energization of said solenoid.

2. Apparatus for segregating bottles and like articles according to predetermined differences in their external surface configuration, comprising a horizontal conveyor for carrying the bottles seriatim and in upright positions along a predetermined path into and through a segregating zone, segregating means in said zone comprising means for supplying air under pressure, a flow control valve connected to the air supply, a solenoid for opening said valve, independent means for closing the valve, an air nozzle positioned to direct a stream of air across the path of travel of the bottles and thereby segregate certain bottles from the others in said zone, a pipe connecting the nozzle to said valve, a gate movable into the path of travel of the bottles for retarding the advance of succeeding bottles while one is being segregated from the remainder, air operated means connected to said pipe for moving the gate in one direction, independent means for reversing the direction of movement of the gate, an electrical circuit connected to said solenoid and including a normally closed switch, an operating arm for said switch positioned to be actuated by bottles which have been segregated from the others in said zone, a normally open switch closable by a bottle to be segregated from the others prior to opening of the first switch whereby to energize the solenoid, open the valve and supply air under pressure to the nozzle and gate operating means.

3. Apparatus for segregating bottles and like articles according to predetermined differences in their external

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surface configuration, comprising, a horizontal conveyor for carrying the bottles seriatim and in upright positions along a predetermined path into and through a segregating zone, segregating means in said zone comprising means for supplying air under pressure, a flow control valve connected to the air supply, a solenoid for opening said valve, independent means for closing the valve, an air nozzle positioned to direct a stream of air across the path of travel of the bottles and thereby segregate certain bottles from the others in said zone, a pipe connecting the nozzle to said valve, a gate movable into the path of travel of the bottles for retarding the advance of succeeding bottles while one is being segregated from the remainder, air operated means connected to said pipe for moving the gate in one direction, independent means for reversing the direction of movement of the gate, an electrical circuit connected to said solenoid and including a normally closed switch, an operating arm for said switch positioned to be actuated by bottles which have been segregated from the others in said zone, a normally open switch closable by a bottle to be segregated from the others prior to opening of the first switch whereby to energize the solenoid, open the valve and supply air under pressure to the nozzle and gate operating means, and a time delay micro-switch actuated and held closed by and during energization of the solenoid.

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