United States Patent

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[73] Assignee **The Nestle-Lemur Company**

[54] **DEVICE FOR ORIENTING REDUCED NECK BOTTLES**
10 Claims, 9 Drawing Figs.

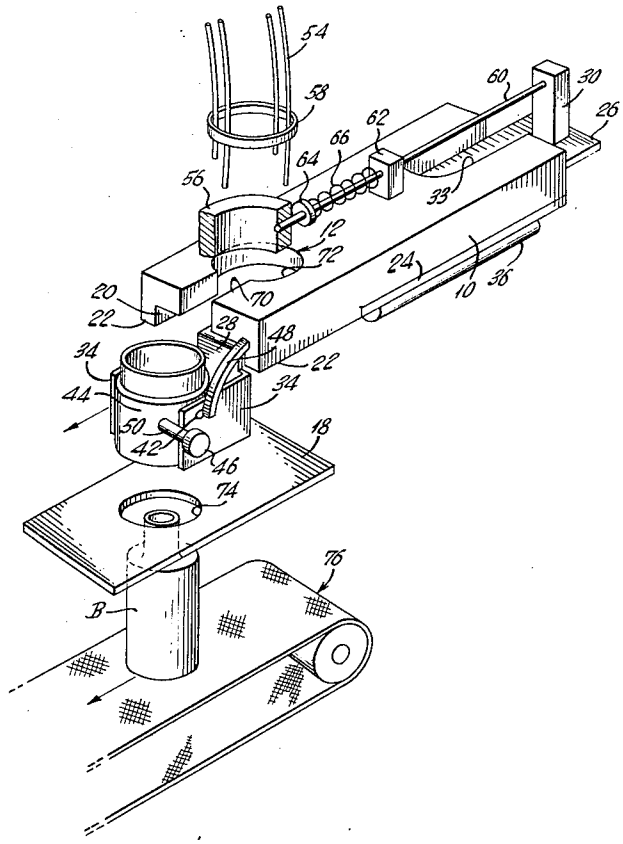
[52] **U.S. Cl.** ..... **193/43 D,** 221/173
[51] **Int. Cl.** **B23q 7/12,** B65g 11/20
[50] **Field of Search** ..... 193/43 B, 43 C, 43 D; 198/33 AD; 221/173

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Attorney—Blum, Moscovitz, Friedman & Kaplan

ABSTRACT: A device for sensing whether reduced neck bottles are in an inverted or in an upright position and for automatically inverting inverted bottles so that they will be situated in an upright position. While the bottles are individually fed along a given path to a given end position, an inverting structure is available for inverting the bottles. However, the inverting structure can only be set into operation by a structure which detects when a bottle is initially in an inverted position. The detecting structure allows upright bottles to pass without setting the inverting structure into operation, so that in this way only the inverted bottles will be acted upon to be placed in their upright positions.



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SHEET 1 OF 3

Fig. 1.

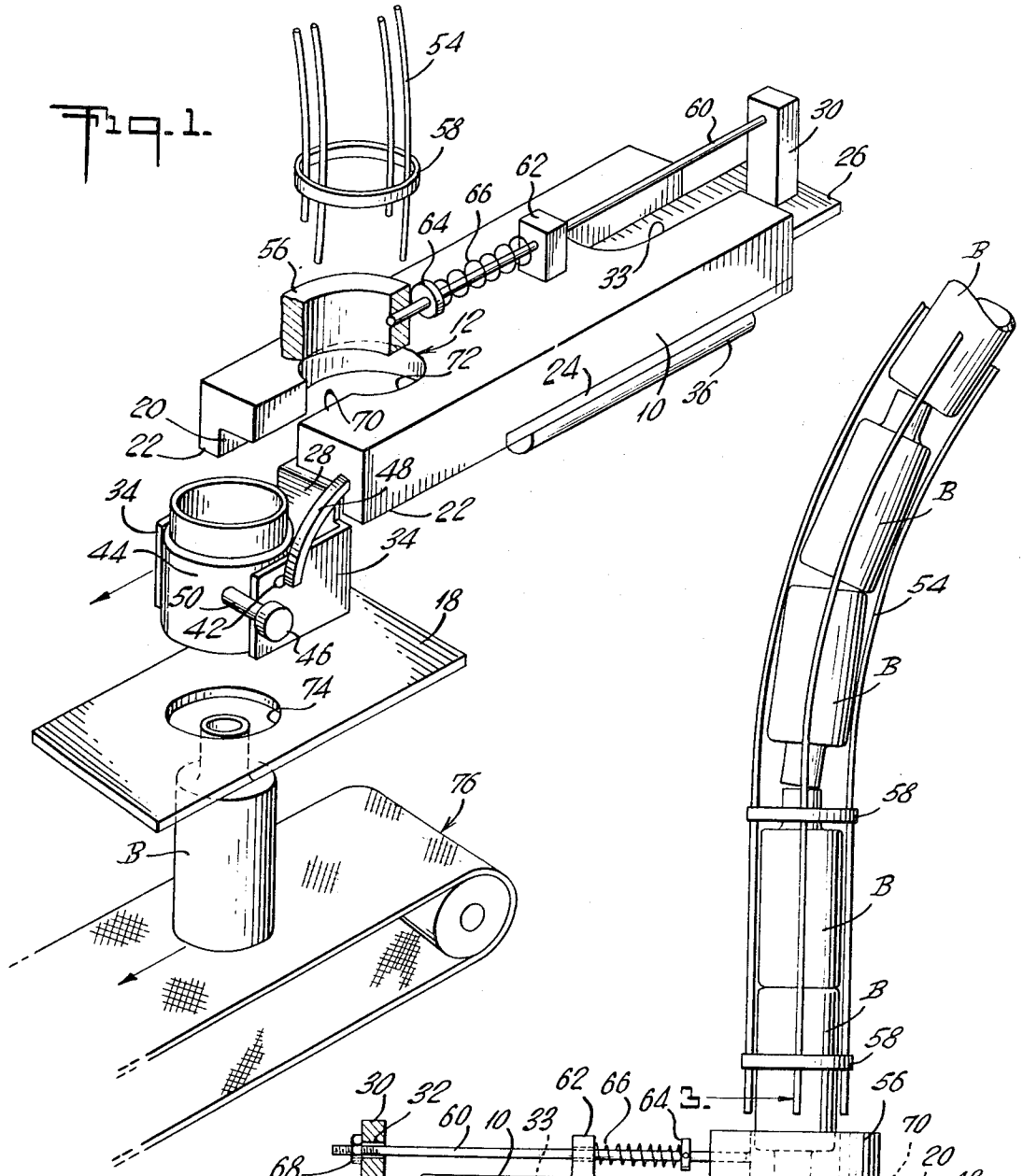
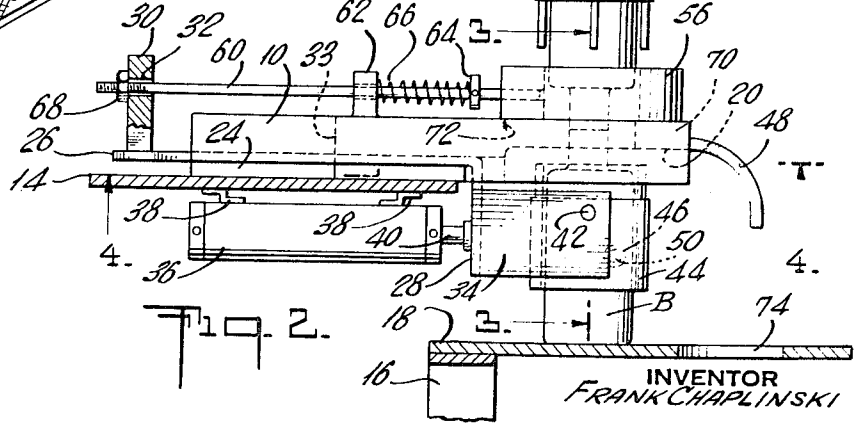


Fig. 2.



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Fig. 3.

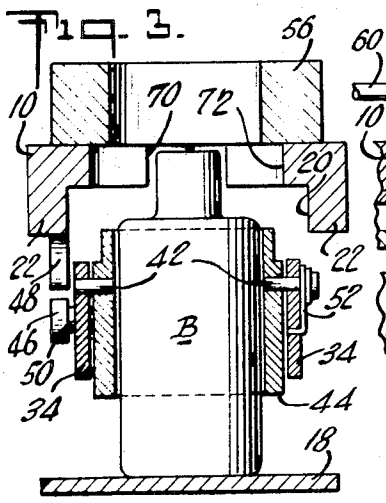


Fig. 5.

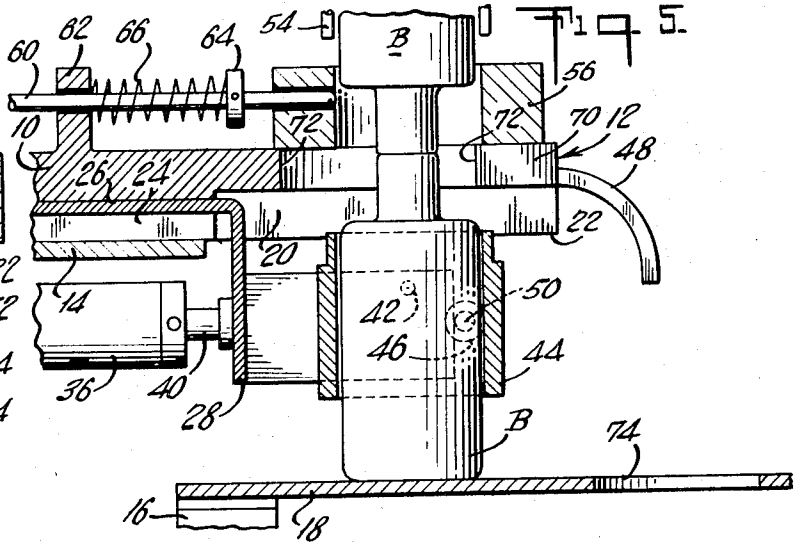


Fig. 4.

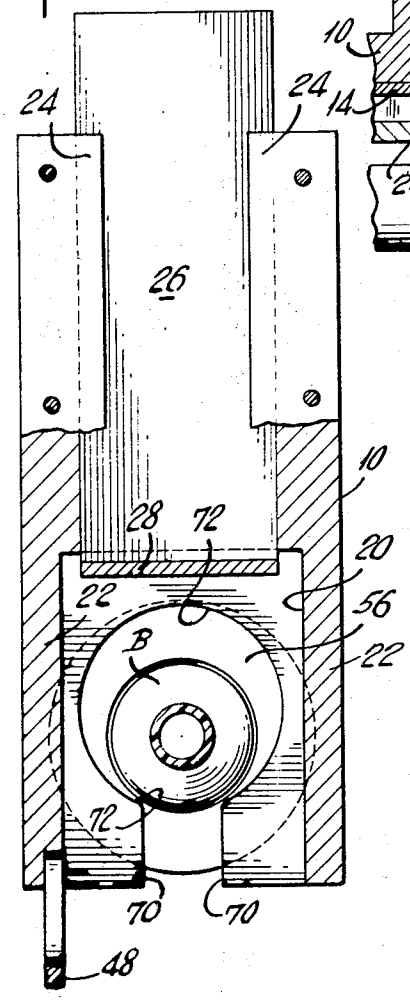
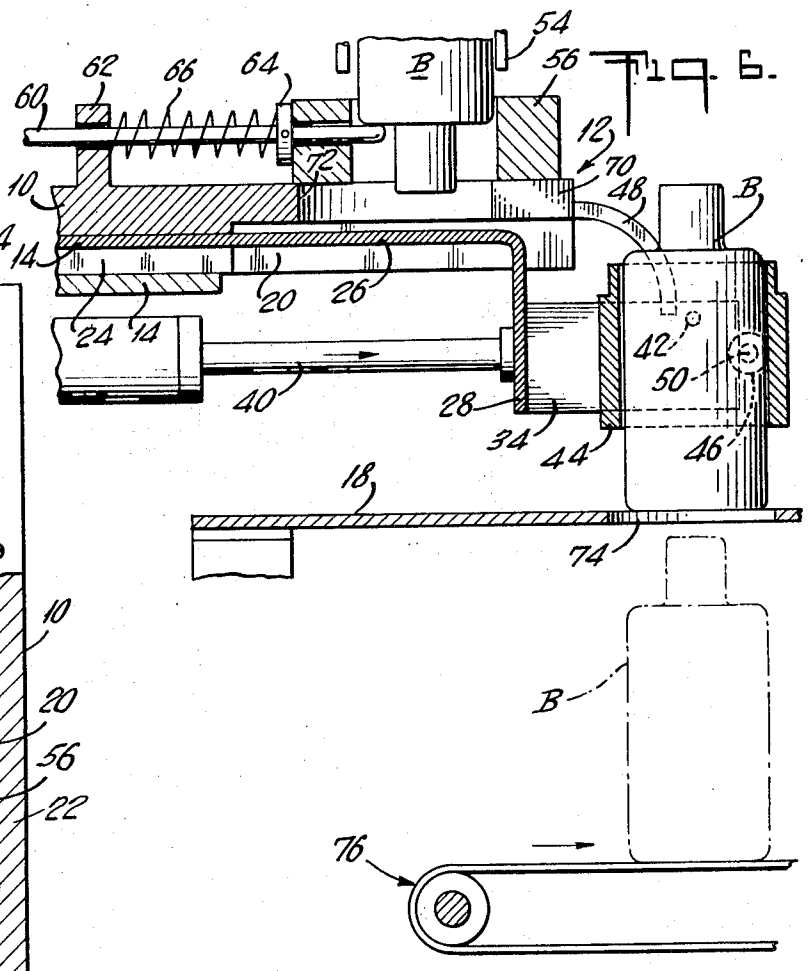


Fig. 6.



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FIG. 7.

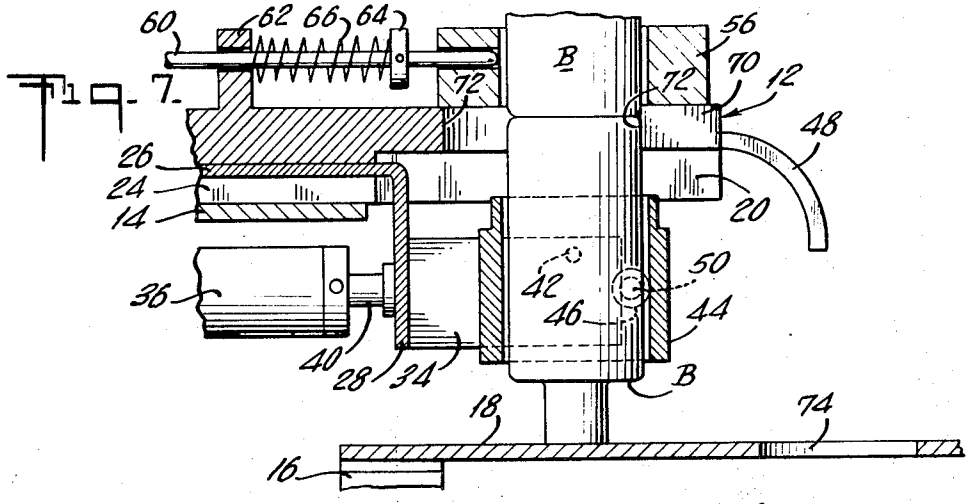


FIG. 8.

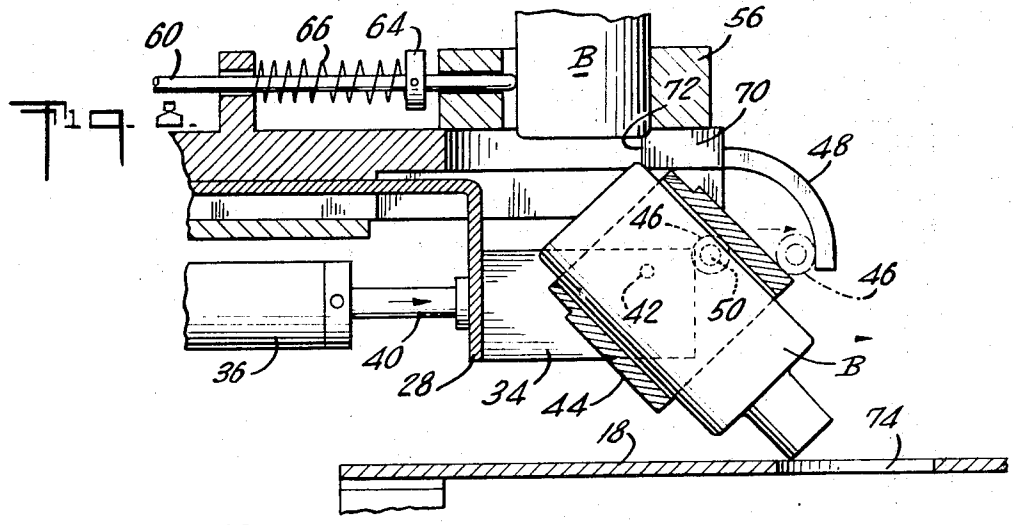
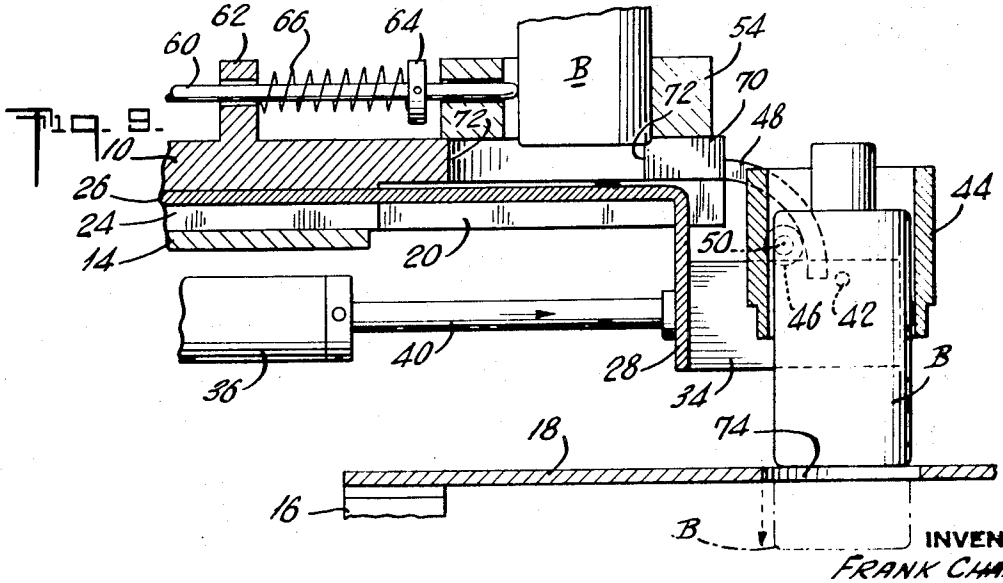


FIG. 9.



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DEVICE FOR ORIENTING REDUCED NECK BOTTLES

BACKGROUND OF THE INVENTION

The present invention relates to devices for setting articles in predetermined positions.

In particular, the present invention relates to devices for orienting reduced neck bottles so that they will all be in an upright position by the time they reach a given location.

Conventional devices which can accomplish this result are fairly complex and sensitive, so that they give rise to undesirably high first costs as well as to undesirably high maintenance costs. The known devices for accomplishing the automatic orientation of bottles or the like require components which will have with respect to each other positions enabling the components to act one way with respect to bottles which assume an upright position and another way with respect to bottles which assume an inverted position. The result is that these known devices must be constructed in special ways so as to be adapted to coact with the configuration of particular bottles. The known devices are easily jammed and are not capable of operating at high speeds in a fully reliable manner.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a construction which will avoid the above drawbacks.

In particular, it is an object of the invention to provide an orienting device which requires no complex controls and which will automatically maintain a structure for inverting a bottle out of operation as long as bottles are upright, so that unnecessary operation of structure is avoided.

Furthermore, it is an object of the invention to provide a construction composed for the most part of rigid rugged elements which operate very reliably to achieve the righting of inverted bottles.

Thus, it is an object of the invention to provide a relatively low-cost structure made up of a relatively small number of components providing a compact assembly which can be operated with a relatively small amount of power to bring about the desired results.

According to the invention, an inverting means is provided for inverting bottles which are fed, one after the other, by feed means to a given end position. The feed means feeds the inverting means, which in turn engages the bottles so as to feed the latter to this end position. A detecting means is situated only in the path of inverted bottles and out of the path of upright bottles so that the detecting means responds only to the movement of inverted bottles toward the end position by the feed means. This detecting means, when detecting the presence of an inverted bottle, automatically sets the inverting means into operation so that the inverting means will turn a bottle from its inverted to its upright position by the time the bottle reaches the end position to which it is fed by the feed means.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated by way of example in the accompanying drawings, which form a part of this application and in which:

FIG. 1 is a fragmentary schematic perspective illustration of a device of the invention shown as it appears from that side where the cam structure of an inverting means is located, so as to clearly illustrate this latter structure;

FIG. 2 is a sectional longitudinal elevation of the structure of FIG. 1 as it appears from the side opposite that which is visible in FIG. 1;

FIG. 3 is a transverse-sectional elevation of the structure of FIG. 2 taken along line 3—3 of FIG. 2 in the direction of the arrows;

FIG. 4 is an upwardly directed plan view of the structure of FIG. 2 taken along line 4—4 of FIG. 2 in the direction of the arrows;

FIG. 5 is a longitudinal fragmentary sectional elevation illustrating the start of an operating cycle when a bottle is delivered in an upright position to the device of the invention;

FIG. 6 is a fragmentary schematic sectional elevation showing the continuation of the operating cycle, the start of which is illustrated in FIG. 5;

FIG. 7 shows the structure of FIG. 5 when a bottle is received in an inverted position by the device of the invention;

FIG. 8 is an illustration of the manner in which the detecting means initiates the operation of the inverting means, FIG. 8 also illustrating in part how the inverting means continues the operation initiated by the detecting means;

FIG. 9 illustrates the end of an operating cycle after a bottle has been inverted to an upright position by the device of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown therein a body 10, the front end of which forms a detecting means 12. This body 10 may be in the form of an elongated channel of rigid metal, for example, and the body 10 is maintained stationary. Thus, as may be seen from FIG. 2, the body 10 is fixedly carried by a stationary plate 14 supported by any suitable frame structure, such as the frame structure 16, which also supports a plate 18 referred to below.

As may be seen most clearly in FIG. 4, the body 10 has at its front end an enlarged interior space 20 defined between the depending side edge portions 22. To the rear of this space 20, these side edge portion 22 fixedly carry guide strips 24, which extend beneath an elongated plate 26, which is thus guided by the strips 24 to move longitudinally with respect to the stationary body 10. At its front end the strip 26 has a depending web portion 28, while at its rear end this elongated plate or strip 26 carries an upstanding lug 30 formed with an opening 32 passing therethrough, as indicated in FIG. 2. The top wall of the body 10 is formed not only with an opening which defines the detecting means 12, at the region of the front end of the body 10, but also with a rear elongated cutout 33 into which the lug 30 can freely move.

The depending web 28 of the strip 26 has a pair of side extensions 34 which extend forwardly beyond the web 28. This component 26 together with the parts 28 and 34 thereof form part of a feed means which includes the fluid-pressure cylinder 36, such as a cylinder receiving air under pressure so that a piston therein can be acted upon pneumatically. The cylinder 36 is fixed to the stationary support plate 14, as by brackets 38 (FIG. 2), and the piston within the cylinder 36 is connected to a piston rod 40 capable of reciprocating with the piston between the end positions respectively illustrated in FIGS. 5 and 6. The pneumatic assembly is double-acting, so that in a well-known manner which is not illustrated, it is possible to displace the piston rod 40 back and forth between the positions shown in FIGS. 5 and 6.

The upper forward end regions of the extensions 34 of the web 28 are respectively formed with aligned openings which receive a pair of coaxial pivots 42 which are affixed to and extend from a sleeve 44 forming a bottle-engaging component of an inverting means. This sleeve 44 is adapted to receive a bottle B in a manner described in greater detail below. Thus, the sleeve 44 of the inverting means is capable of swinging about the common axis of the pivots 42. The inverting means includes a cam-follower roller 46 which coacts with a cam 48 to bring about the turning of initially inverted bottles to upright positions in a manner described in greater detail below. The cam 48 is in the form of a simple rigid member of arcuate configuration extending approximately through an angle of 90° about a given center of curvature and fixed at one end to and projecting from the front end of the body 10 in the manner shown most clearly in FIG. 1. The cam-follower roller 46 is turnable on a rod 50 which is affixed to and projects laterally from the sleeve 44 in the manner shown most clearly in FIG. 1. As is indicated in FIG. 3, a spring 52 is coiled about and fixed to an extension of one of the pivots 42 while engaging one of the extensions 34 so as to urge the sleeve 44 to the position shown in FIG. 1 where the rod 50 engages the front edge of the extension 34 which is shown at the right in FIG. 1.

A supply means is provided for supplying the bottles B one-by-one to the sleeve **44** of the inverting means of the invention when the feed means locates the sleeve **44** in the starting position shown in FIGS. **5** and **7**. This supply means includes the wire guide rods **54** which guide the bottles B, haphazardly oriented as shown in FIG. **2**, downwardly to the body **10**. The body **10** fixedly carries, at its upper surface at the region of its front end, a ring **56** through which the bottles move into and through the detecting means **12**. The rods **54** are held in their assembled condition by rings **58**. The ring **56** is formed with a radial opening which receives one end of an elongated rod **60** which passes through the opening **32** of the lug **30** as well as through an opening formed in a guide lug **62** fixed to and projecting upwardly from the top surface of the body **10**. Between the ring **56** and the lug **62** the rod **60** fixedly carries a collar **64** against which one end of a coil spring **66** abuts. The spring is coiled about the rod **60** and extends between the collar **64** and the lug **62** so as to urge the rod **60** toward the right, beyond the position shown in FIG. **2**. The rear end of the rod **60** is threaded and carries a nut **68** which engages the lug **30** so that when this lug is in the position of FIG. **2**, the rod **60** will be retracted in opposition to the spring **66** to the position illustrated where the front end of the rod **60** does not extend into the space surrounded by the ring **56**. This is the position of the rod **60** which is shown at an enlarged scale, as compared to FIG. **2**, in FIG. **5**. The piston rod **40** is fixed to the web **28** so that this web, together with the remainder of the feed means, will necessarily reciprocate together with the rod **40**.

The detecting means **12** is formed by the elongated front end portion of the top wall of the body **10** where this top wall is formed with an elongated, relatively narrow passage **70** communicating with a circular part **72** of the detecting means which defines a circular space beneath the ring **56**. Thus, the detecting means **12** is formed in the illustrated example by a front portion of the top wall of the body **10** where this top wall is formed with an opening of substantially keyhole configuration defined by the circular part **72** and the elongated passage **70**.

The feed means will feed each bottle from the starting position of FIGS. **5** and **7** to an end position where each bottle will fall through an opening **74** formed in the support plate **18**, along which each bottle slides while it is fed by the feed means to the end position where the opening **74** is located. As each bottle falls through the opening **74**, it will be received by the upper run of a belt conveyor **76** so as to be conveyed away from the location beneath the opening **74**.

It is apparent that the elements described above form various units. Thus, the front end region of the top wall of the body **10** forms the detecting means **12**. The sleeve **44** together with the cam and cam-follower assembly **48**, **46** form an inverting means. The pneumatic structure **36**, **40** together with the strip **26** and its web **28** and extensions **34** form a feed means for feeding the bottles from the starting position of FIGS. **5** and **7** to the end position of FIGS. **6** and **9**, the bottles being supported for sliding movement at this time by the plate **18**. The components **54**, **56**, **58** form a supply means, which includes the control rod **60**, for supplying the bottles one-by-one to the bottle-engaging member **44** of the inverting means when the parts are in the starting position shown in FIGS. **5** and **7**.

This structure described above operates as follows. Assuming that the parts are in the position of FIG. **5**, it will be seen that the front end of the rod **60** is retracted away from the downward movement of the bottles through the ring **56**, and a bottle has been received in an upright position in the sleeve **44**, resting on the plate **18**, so that the upright bottle in the sleeve **44** in FIG. **5** maintains the next bottle at the illustrated elevation. Through any suitable controls an operating cycle is initiated, so that the rod **40** starts to move from the position of FIG. **5** toward the position of FIG. **6**. The result is that the strip **26** is moved to the right, as viewed in FIGS. **5** and **6**, and in this way, as shown in FIG. **2**, the lug **30** moves away from the nut **68** so that the spring **66** can expand to act on the collar **64** so as to displace the rod **60** to the position of FIG. **6**, where the front end of the rod is situated beneath a shoulder of the next bottle to prevent the latter from continuing its downward movement.

The feed means continues to feed the upright bottle toward the end position shown in FIG. **6**. The passage **70** of the detecting means **12** is wide enough to permit the reduced neck of the bottle to pass freely through this passage, so that when each bottle is in the upright position shown in FIG. **5**, the detecting means **12** is in fact situated beyond the path of movement of each bottle and will not engage any part thereof. The elevation of the cam follower **46**, with the parts in the position of FIG. **5**, is such that the cam follower simply moves beneath the lower free end of the cam **48**, and thus the inverting means will not be set into operation when an upright bottle is received in the sleeve **44**. The parts will therefore advance to the position of FIG. **6**, where the upright bottle will fall through the opening **74** so as to be received on the conveyor **76**.

The pneumatic control structure now operates to return the rod **40** to the position of FIG. **5**, and thus all of the parts return to their initial positions. The lug **30** acts on the nut **68** to retract the rod **60** to the position of FIGS. **2** and **5**, so that the next bottle will drop down through the ring **56** and the detecting means **12** into and through the sleeve **44** to be received on the plate **18**. Assuming that this next bottle is in an inverted position, then it will have the position indicated in FIG. **7**.

It will be noted that at this time it is the bottom end of the bottle which is at the elevation of the detecting means **12**. This bottom end of the bottle is too large to move through the passage **70**, so that the detecting means **12** of the invention is situated in the path of movement of an inverted bottle but out of the path of movement of an upright bottle. Therefore, when the rod **40** is moved from the position of FIG. **7** toward the position of FIG. **8**, the bottom end of the inverted bottle will be engaged by the circular part **72** at the entrance end to the passage **70**, with the result that the bottle is inverted through an initial increment substantially as indicated in FIG. **8** by the detecting means **12** itself. This initial increment of turning of the bottle is sufficient to raise the cam follower **46** to an elevation where it will engage the stationary cam **48** and where the center of the cam follower **46** is above the center of the pivots **42**. Therefore, when the cam follower reaches the cam **48**, it will engage the latter and will ride up along the inner curved surface of the cam **48** so that once the inverting movement has been initiated through a predetermined angle by the detecting means **12**, the inverting movement will be continued by the inverting means with the follower ultimately reaching the position shown in FIG. **9**, where the bottle has been oriented in an upright position so that it will now fall through onto the conveyor in an upright position. As the rod **40** advances to the right from the position of FIG. **7**, the rod **60** will be pressed by the spring **66** against the exterior of the next bottle to hold the latter against falling until the parts resume their initial position.

Thus, with the structure of the invention it is the detecting means **12** which automatically sets the inverting means into operation by first bringing about an initial tilting movement of the bottle from its inverted toward its upright position.

When the rod **40** is retracted from the position of FIG. **9** back toward the position of FIG. **7**, after a bottle has fallen through onto the conveyor, the spring **52** will act automatically to swing the sleeve **44** back to its initial position.

What is claimed is:

1. In a device for orienting reduced neck bottles, inverting means for engaging and inverting a bottle, feed means for feeding said inverting means and a bottle engaged thereby along a given path to an end position where each bottle moves beyond said inverting means, and detecting means situated in the path of movement of an inverted bottle toward said end position but out of the path of movement of an upright bottle toward said end position for detecting the presence of an inverted bottle and for initiating the operation of said inverting

means only when the presence of an inverted bottle is detected, said inverting means when set into operation by said detecting means inverting a bottle from an inverted to an upright position by the time the bottle reaches said end position and said inverting means maintaining an initially upright bottle in its upright position during feeding of said inverting means and a bottle engaged thereby by said feed means to said end position.

2. The combination of claim 1 and wherein said detecting means turns an inverted bottle, while the latter is fed by said feed means, and said inverting means therewith, through an initial increment from said inverted toward said upright position, and said inverting means responding only to the initial turning of a bottle together with said inverting means through said initial increment by said detecting means to continue the turning of the bottle to its upright position.

3. The combination of claim 2 and wherein said inverting means includes a bottle-engaging member swingably connected to said feed means to be fed thereby while capable of swinging the inverted bottle from an inverted to an upright position, and a cam and cam follower, one of which remains stationary and the other of which is connected with said bottle-engaging member for movement therewith, said cam and cam follower remaining out of cooperative relationship with respect to each other when an upright bottle is fed by said feeding means, so that said detecting means is out of the path of the latter bottle, and said detecting means when turning a bottle and said bottle-engaging member therewith through said increment placing said cam and cam follower in a cooperative relation where they act to continue the turning of a bottle to its upright position.

4. The combination of claim 3 and wherein said bottle-engaging member is a sleeve through which the bottle extends, said feed means having a bracket swingably carrying said sleeve, said cam follower being carried by said sleeve at the exterior thereof and said cam being stationary and situated beyond said cam follower except when said bottle is initially tilted by said detecting means for swinging said sleeve and said cam follower to a position where said cam will coact with said cam follower to continue the turning of the sleeve and a bottle therewith to a position which will situate the bottle in an upright position.

5. The combination of claim 4 and wherein a spring means coacts with said sleeve for returning the latter to its initial position after a bottle which has been inverted to an upright position moves beyond said sleeve at said end position.

6. The combination of claim 4 and wherein said feed means returns said sleeve to a starting position, and supply means for supplying bottles one-by-one, either in an upright or in an inverted position, to said sleeve when the latter is in said starting position.

7. The combination of claim 4 and wherein a plate supports each bottle as it is moved by said feed means, said plate being formed with an opening situated at the end position of each bottle and through which each bottle moves when reaching said end position.

8. The combination of claim 7 and wherein a conveyor is situated beneath said plate opening to receive each bottle and convey it away from said opening.

9. The combination of claim 1 and wherein said detecting means is in the form of a stationary member formed with a passage, at the elevation of the reduced neck of an upright bottle, sufficiently wide to permit the reduced neck to move through said passage without any tilting of the bottle by said detecting means, said passage being too narrow to permit the bottom end of a bottle to pass therethrough, so that when a bottle is in an inverted position, said bottom end thereof will engage the detecting means to be tilted thereby.

10. The combination of claim 9 and wherein said detecting means is formed with an opening of keyhole configuration having a circular portion large enough to accommodate the bottom of a bottle as well as the reduced neck thereof and having said passage extending from said circular portion so that said circular portion will engage the bottom of an inverted bottle while the reduced neck of an upright bottle will pass freely through said passage out of the space surrounded by the circular portion of said detecting means.

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