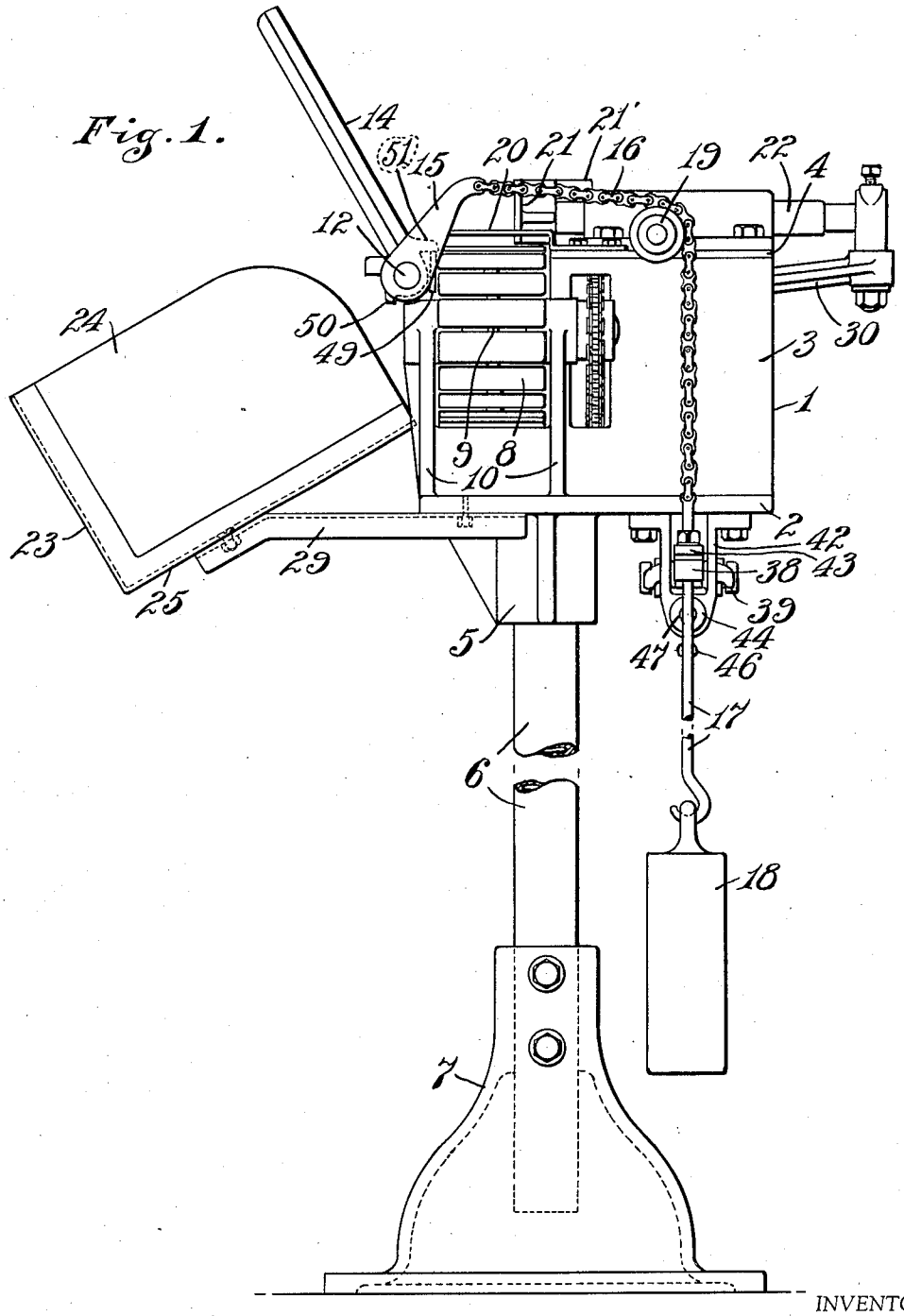
Nov. 19, 1935. C. H. MILLER 2,021,696

BOTTLE INSPECTING APPARATUS

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Fig. 1.



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Fig. 2.

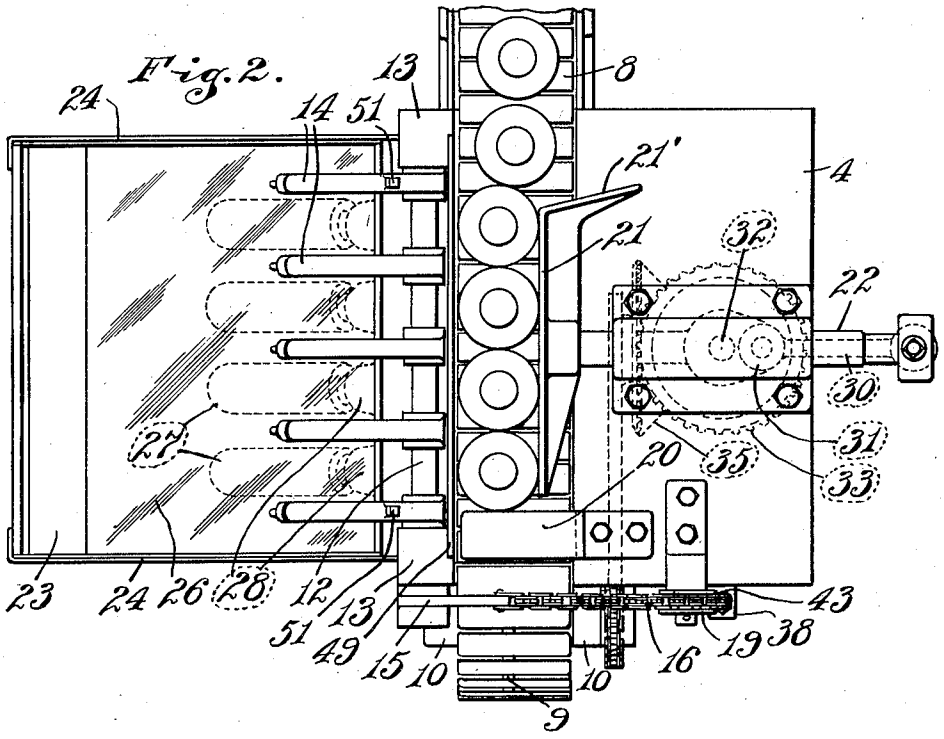
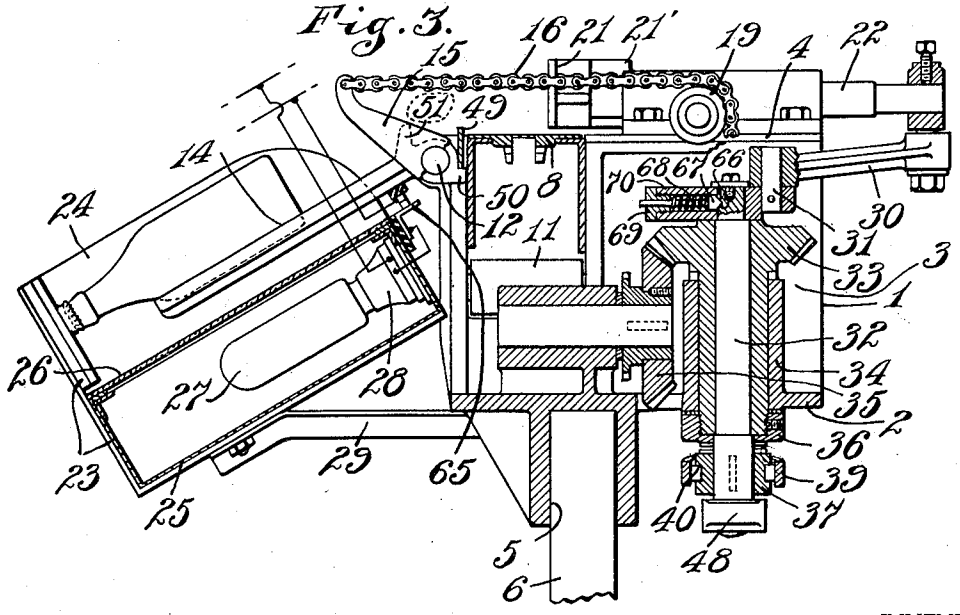


Fig. 3.



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BOTTLE INSPECTING APPARATUS

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Fig. 4.

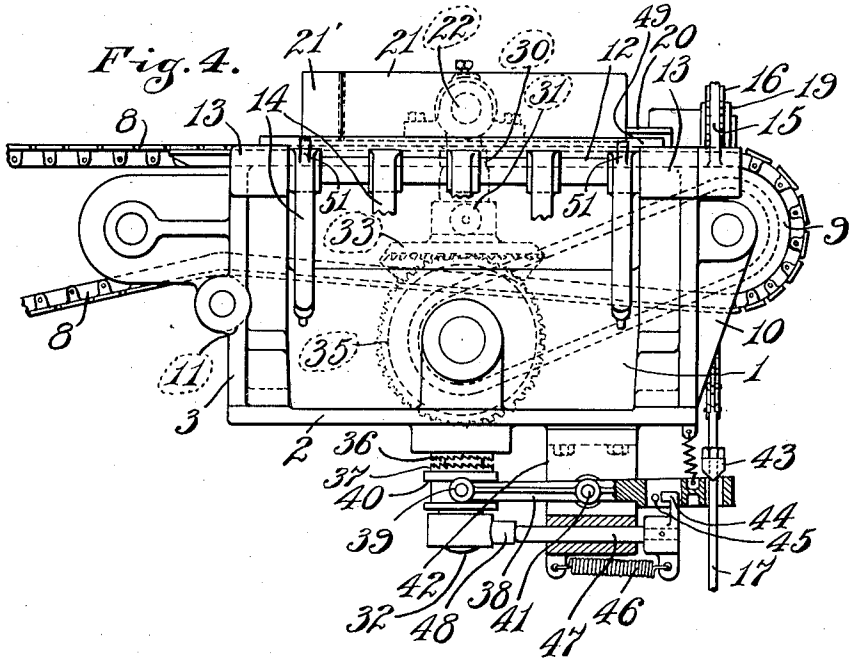


Fig. 5.

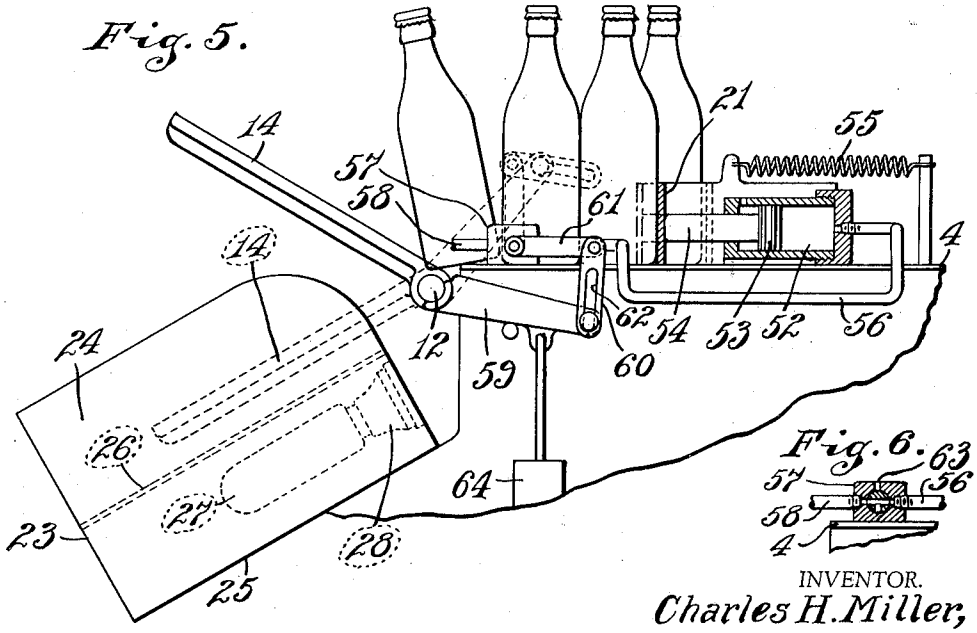


Fig. 6.

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Patented Nov. 19, 1935 2,021,696

UNITED STATES PATENT OFFICE

2,021,696

BOTTLE INSPECTING APPARATUS

Charles Herman Miller, Chicago, Ill., assignor to The Liquid Carbonic Corporation, Chicago, Ill., a corporation of Delaware

Application February 6, 1932, Serial No. 591,434

8 Claims. (Cl. 198—27)

My invention relates to machines for handling filled bottles of beverages, primarily for the purpose of inspecting the contents of the bottles. My invention has for another object that of mixing the contents of the bottles during their inspection, not only for the purpose of mixing the contents thoroughly but also for the purpose of insuring a more thorough inspection thereof.

My invention is designed to permit rapid inspection and handling of bottled beverages or other bottled goods with a minimum effort on the part of the operator and with a minimum eye strain to the operator.

For the purpose of disclosing my invention I have illustrated certain embodiments thereof in the accompanying drawings, in which:

Fig. 1 is an end elevation of an apparatus embodying my invention;

Fig. 2 is a plan view of the structure illustrated in Fig. 1;

Fig. 3 is a detailed transverse section of the machine illustrated in Figs. 1 and 2;

Fig. 4 is a front elevation of the inspection apparatus with the illuminating box removed;

Fig. 5 is an end elevation, more or less schematic, of a modified construction embodying my invention, and

Fig. 6 is a detailed section of the control valve used in the structure illustrated in Fig. 5.

In the embodiment of the invention illustrated in the accompanying drawings having reference first to the structure illustrated in Figs. 1 to 4 inclusive, a base structure 1 is provided comprising a bottom plate 2 from which vertically extends a pair of side plates 3, which in turn support at their tops a top table 4. The bottom plate 2 is provided with a socket 5 adapted to receive a support post or standard 6 adjustably supported in a base 7.

A suitable flexible conveyor 8 preferably of the continuous type, travels longitudinally of the top plate 4, in the same plane thereof and in proximity to the front edge of the support base. This conveyor passes over an operating sprocket 9 mounted between extension arms 10 on one of the side members 3 and the bottom course returns through the side members, it being guided by suitable rollers 11 supported in the base structure 1. Adjacent the front edge of the conveyor 8 is mounted an oscillating shaft 12 supported in suitable bearings 13—13 extending forwardly from the side members 3. This shaft has fixed thereon a series of fingers 14, illustrated as at 5. These fingers are spaced apart a sufficient distance to support a bottle between the same without permitting the bottle to drop through.

The fingers are maintained in their raised or upper position by means of a crank arm 15 secured to the shaft 12 and having its outer end connected by a flexible chain coupling 16 and a link rod 17 with a counter-weight 18. This chain passes over a roller 19 located to the rear of the arm 15.

The bottles to be inspected are brought opposite the supporting fingers 14 by means of the traveling conveyor 8 and are prevented from moving past their predetermined position by an end stop member 20 overhanging the conveyor and in the path of the bottles and supported or bolted to the top plate 4. When the bottles strike the stop member 20 the conveyor may continue in its movement without moving the bottles any farther as there is a certain amount of slippage between the bottles and the conveyor. When the bottles have reached a position opposite the arms 14 they are moved off of the conveyor and on to the arms by means of a pusher plate 21 mounted on the front end of a reciprocating plunger 22 supported on the plate 4. This plunger moves the bottles transversely of the conveyor and causes them to tilt onto the supporting arms 14. This pusher plate 21, at its forward end is provided with a stop plate 21' which, when the pusher plate has reached the limit of its transverse movement is pushed in the path of the bottles on the conveyor 8 to prevent a continued forward movement of the bottles until after the pusher plate has been retracted.

When the bottles are tilted on to the supporting arm 14, by means of the pusher plate 21, their weight is sufficient to overcome the counter-balancing weight 18 and cause the rocking of the arms to a lowering position.

Mounted in a position to receive the arms in their lowered position, and accordingly receive the bottles, is an inspection box comprising a rectangular box having a front 23 and two sides 24, the side of the box towards the machine being left open. Interposed between the bottom 25 of the box and the stop position of the arms 14 is preferably a ground glass translucent shield 26 and mounted beneath this shield is a series of electric lamps 27, one for each bottle, supported in sockets 28. The inspection box is preferably supported from arms 29 extending from the base member 1 and is supported in a tilted position so that, when the bottles are supported by the arms in the lowered position, the bottles

will lie parallel with the lamps 27 with the ends of the bottles abutting against the front plate 23.

In the bottling of beverages, particularly flavored beverages, the syrup is first deposited in the bottle and then the bottle is filled with suitable carbonated water. As a result of this manner of filling the bottles the syrup, until the bottle is agitated lies in a stratum at the bottom of the bottle having above it a stratum of water. As a result, under the heretofore known commercial types of bottle inspecting devices, due to the dense and comparatively darkly colored syrup in the bottom of the bottle complete inspection could not be made as it has been difficult to see any foreign particles which would naturally tend to drop to the bottom of the bottle. With applicant's structure, due to the tilting of the bottle as it is being deposited into the inspection box, this denser and colored syrup is mixed with the carbonated water thereby becoming more transparent and any particles which have settled in the bottom of the bottle would tend to float toward the top so that they would be more readily seen.

After the bottles have been inspected in the inspection box they are removed by the operator and when the weight of the bottles has been removed from the fingers 14 the counter-balancing weight 18 will raise the fingers to their initial position and in a position to receive another series of bottles. The pusher 21 is again moved forward to repeat the process of depositing the bottles on the fingers. To the end that the pusher may be automatically operated the pusher rod 22 is connected by a link bar 30 with a crank arm 31 mounted on the shaft 32. This shaft has rotatably mounted thereon a driving bevel gear 33, the hub of which is extended through the bearing 34. This bevel gear 33 is driven by a bevel gear 35 operated from any suitable source of power such as an electric motor, or other means. The lower end of the hub 34 is provided with a clutch member 36 adapted to cooperate with a second clutch member 37 splined or keyed on the shaft 32 and axially movable thereon, this axial movement being imparted thereto by a shift lever 38 having a fork 39 operating in an annular groove 40 on the clutch member 37 and pivoted as at 41 on a support 42 extending downwardly from the base member 1. The opposite end of this lever has passing therethrough the connecting link rod 17 of the counter-weight 18 and this link rod has mounted thereon and above the lever 38 a lever operating stop 43. Therefore as the counter-weight is lowered with the raising of the arms 14, this stop 43 engaging the end of the lever 38 depresses this end and engages the clutch, connecting the shaft 32 with its driving power through the bevel gears 33 and 35. At the same time that the outer end of the lever 38 is depressed it is caught by a latch member 44 adapted to engage a pin 45 on the lever and biased to engaging position by a coiled spring 46. This latch member is mounted on a rod 47 one end of which bears against a cam 48 on the end of the shaft 32. The cam is so positioned on the shaft as to move the latch into engaging position as soon as the end of the lever 38 is depressed by the stop 43 and maintain the same in this position, and the clutch therefore engaged, during one cycle of movement of the pusher member 21. That is, the clutch is maintained engaged until the pusher member has advanced transversely of the conveyor 8 to deposit a set of bottles on the fingers 14 and then retracted to its initial position. By the time the pusher member 21 has been retracted to its initial position the fingers 14 will have been lowered sufficiently to raise the stop member out of engagement with the end of the lever 38 so that, at this time the latch member 44 will be disengaged from the finger 45 permitting the pusher member to come to rest, and the pusher will not again be operated to deposit another set of bottles on the fingers until the fingers have been raised to receiving position.

In order to prevent the bottles which are moved into position on the conveyor, during the time that the fingers 14 are in their lowered position from being crowded off of the conveyor, I provide a stop arm 49 which is arranged along the side of the conveyor and which is engaged by fingers 50 on the fingers or arms 14 to raise the same when the fingers or arms 14 are in their lowermost position. A second set of fingers 51 depress this side member 49 when the arms or fingers 14 are raised so that, it will offer no obstruction to the passage of the bottles from the conveyor on the arms or fingers 14. In Figs. 5 and 6 I have illustrated a modified construction of my invention wherein the pusher member 21 is operated by air pressure. To this end I provide an air cylinder 52 having a piston 53 operating therein, which piston is connected with the pusher member 21 by a piston rod 54. The pusher member 21 is biased towards its retracted position by a suitable coiled spring 55. The rear end of the cylinder 52 is connected by suitable piping 56 through a two-way valve 57 and a conduit 58 with a suitable source of pressure supply. An arm 59 is connected to the shaft 12 and through the means of a link 60, the free end of this arm is connected to an operating arm 61 for the two-way valve. The link 60 is provided with a slot 62 to permit a lost motion between the arm 51 and the link 60. With this construction as the arms or fingers 14 move to their lowermost position, the free end of the arm 59, through the link 60 and the arm 61, rotates the two-way valve to a position to shut off the supply of fluid pressure and at the same time connect the cylinder 52 with an exhaust 63. This exhausts the pressure behind the piston 53 permitting the spring 55 to return the pusher to its retracted position. As soon, however, as the arms or fingers 14 move to their raised position under the influence of the counter-weight 64, after the bottles have been removed therefrom, the valve 57 is operated to shut off the escape opening 63 and admit pressure to the cylinder 52 thereby projecting the pusher member across the conveyor.

In order to reduce the current consumption and to prevent the lamps from burning except during actual inspection periods, I introduce in the electrical circuit of the lamps a switch 65 which is adapted to be closed when the supporting arms and fingers 14 are in their lowered position and opened when the fingers 14 move to their upper or receiving position.

If for any reason the bottles on the conveyor become jammed or are prevented from moving transversely of the conveyor during the pushing movement of the pusher 21, there would be danger of breaking the bottles or some part of the machine. To prevent this the crank arm 31 is releasably connected to the shaft 32. The shaft 32 is provided with a notch or recess 66 in which engages a pin 67 biased in its engaging position by a coiled spring 68 interposed between the head of the pin and a plug 69 threaded into the housing 70 for the pin. This construction

normally holds the crank arm 31 connected to the shaft 32 but in event of an overload for any reason the parts will be disconnected until normal conditions are restored.

I claim the following:

1. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles to be inspected in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor with the axes of their pivots substantially in the same plane as the conveyor and parallel with the line of travel of the conveyor, the spaces between the supports being less than the width of a bottle, said supporting members in their receiving position projecting at an angle above the horizontal and in a position to receive the bottles neck up and swingable on their pivots from said position to an angle below the horizontal to substantially invert the bottles, and means for moving the bottles transversely of the conveyor onto the supports when the same are in receiving position.

2. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor in substantially the same plane as the conveyor with the axes of their pivots parallel with the line of travel of the conveyor, the spaces between the supports being less than the width of a bottle, means for biasing said supports in a position above the horizontal and sufficiently inclined from the vertical to receive the bottle in an inclined position to cause the weight of the upper part of the bottle to overcome said biasing means and rotate said supports on their pivots to a position inclined below the horizontal to substantially invert the bottles, and means for moving the bottles transversely of the conveyor and onto the supports when they are in their receiving position.

3. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor in substantially the same plane as the conveyor with the axes of their pivots parallel with the line of travel of the conveyor, the spaces between said supports being less than the width of a bottle, said supporting members in their receiving position projecting in an angle above the horizontal and in a position to receive the bottle neck up and swingable on their pivots from said position to an angle below the horizontal to substantially invert the bottles, and intermittently operated transfer means for moving the bottles transversely of said conveyor and onto said supports.

4. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor in substantially the same plane as the conveyor with the axes of their pivots parallel with the line of travel of the conveyor, the spaces between the supports being less than the width of a bottle, said supporting members in their receiving position projecting at an angle above the horizontal and in a position to receive the bottles neck up and swingable on their pivots from said position to an angle below the horizontal to substantially invert the bottles, means for moving the bottles transversely of the conveyor onto the supports, and means for preventing operation of said transfer means until the supports have resumed receiving position.

5. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor in substantially the same plane as the conveyor with the axes of their pivots parallel to the line of travel of the conveyor, the spaces between the supports being less than the width of a bottle, said supporting members in their receiving position projecting at an angle above the horizontal and in a position to receive the bottles neck up and swingable on their pivots from said position to an angle below the horizontal to substantially invert the bottles, means for stopping the movement of said bottles on said conveyor with the bottles opposite the spaces between said supports, and means for moving the bottles transversely of said conveyor onto said supports.

6. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor in substantially the same plane as the conveyor with the axes of their pivots parallel with the line of travel of the conveyor, the spaces between the supports being less than the width of a bottle, said supporting members in their receiving position projecting at an angle above the horizontal and in a position to receive the bottles neck up and swingable on their pivots from said position to an angle below the horizontal to substantially invert the bottles, means for moving the bottles transversely of the conveyor onto the supports, driving means for said means and a slip connection between said driving means and said means.

7. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a plurality of spaced-apart bottle supporting members pivoted at their lower ends at the side of the conveyor in substantially the same plane as the conveyor with the axes of their pivots parallel with the line of travel of the conveyor, the spaces between the supports being less than the width of a bottle, said supporting members in their receiving position projecting at an angle above the horizontal and in a position to receive the bottles neck up and swingable on their pivots from said position to an angle below the horizontal to substantially invert the bottles, reciprocating means for moving the bottles transversely of the conveyor onto the supports, operating means for said reciprocating means, and means for preventing the projection of said reciprocating means after it has been retracted until said supporting members have moved to their receiving position.

8. In a filled bottle inspecting machine, the combination with a conveyor supporting the bottles in a vertical upright position, of a rock shaft arranged at one side of said conveyor with its axis parallel with the line of travel of the conveyor, a plurality of fingers mounted on said rock shaft, means for biasing said rock shaft in a position to project said fingers above the

horizontal and inclined from the vertical, a reciprocating member moving transversely of the conveyor to move the bottles on said conveyor to said fingers and tilt the same to cause the weight of the bottle to overcome said biasing means and rotate said rock shaft to project the fingers at an angle below the horizontal to substantially invert the bottles, drive means for said reciprocating means, and means controlled by said rock shaft for rendering said drive means inoperative to project said reciprocating means across the conveyor while said fingers are in a position below the horizontal.

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