

Oct. 13, 1942.

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2,298,475

MACHINE INCLUDING MEANS FOR CLEANING CONTAINERS

Filed Aug. 29, 1939.

3 Sheets-Sheet 1

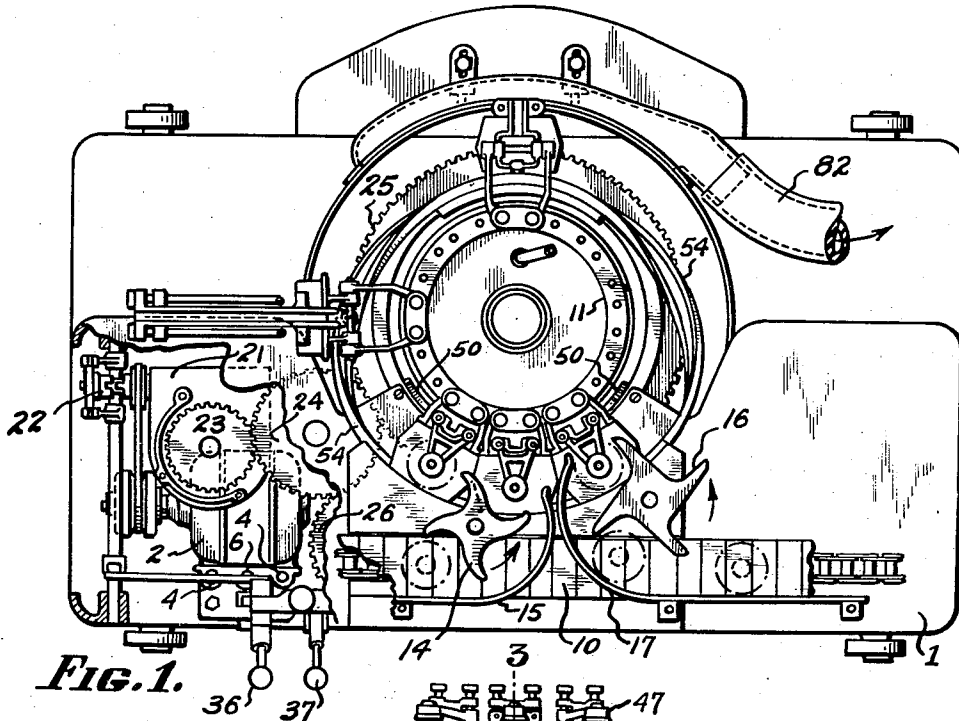


FIG. 1.

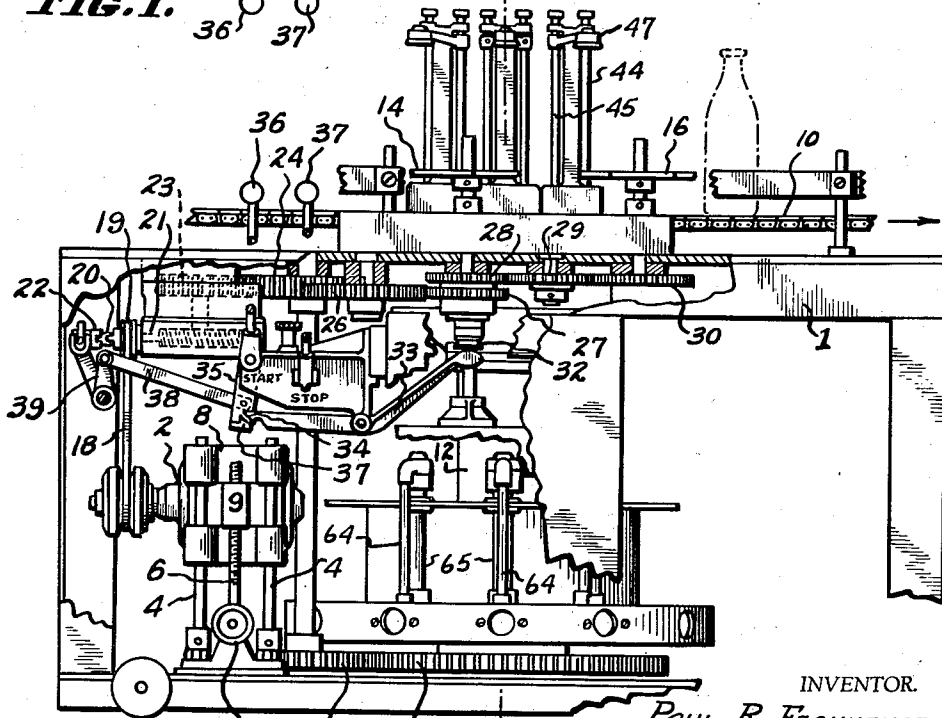


FIG. 2.

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3 Sheets-Sheet 2

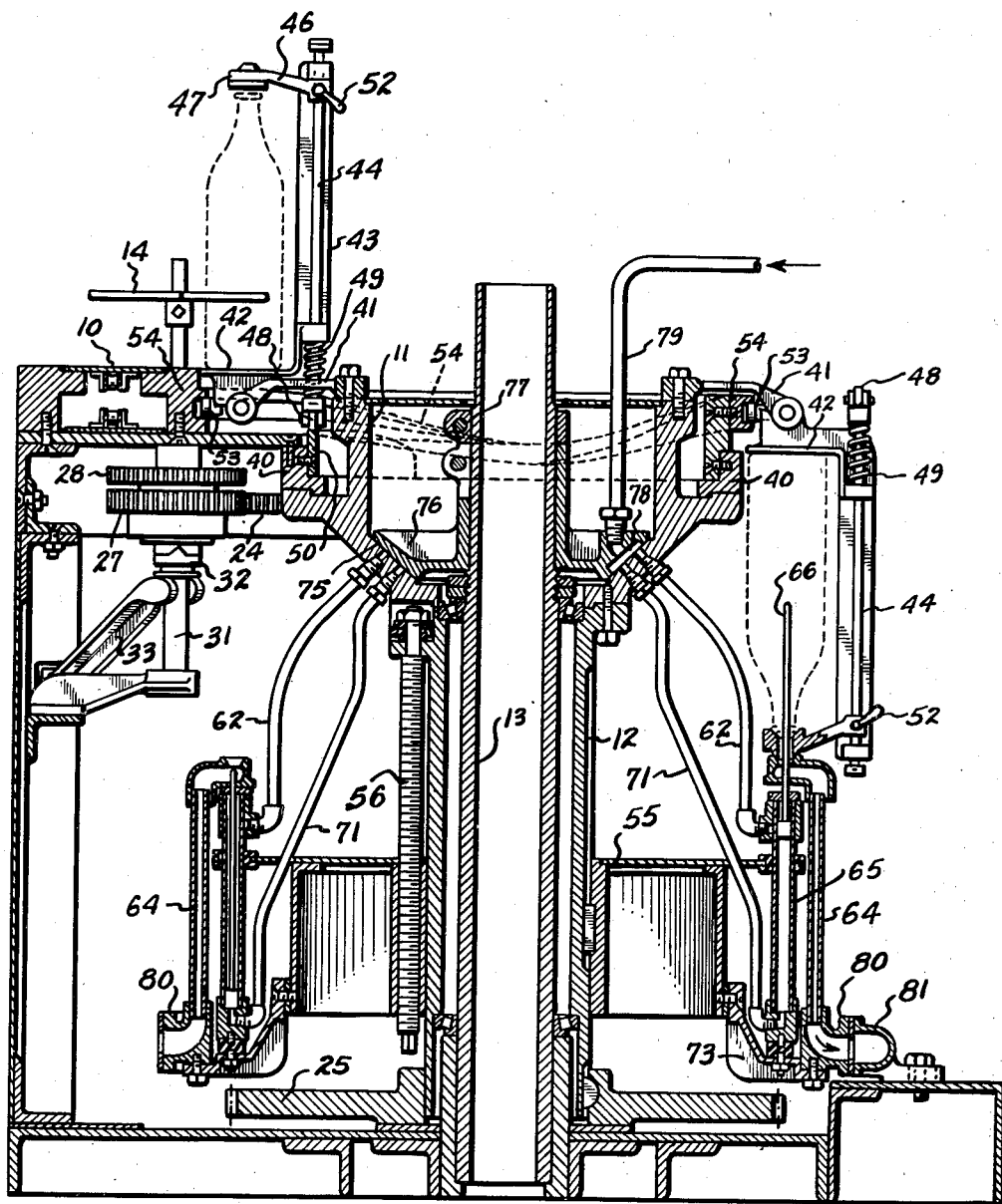


FIG. 3.

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3 Sheets-Sheet 3

FIG. 5.

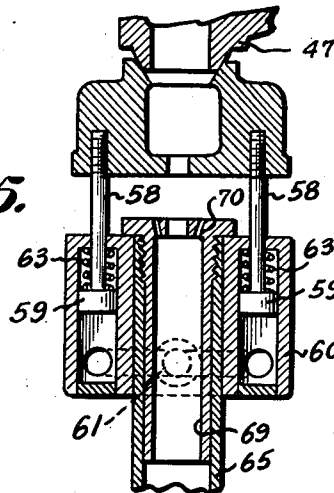
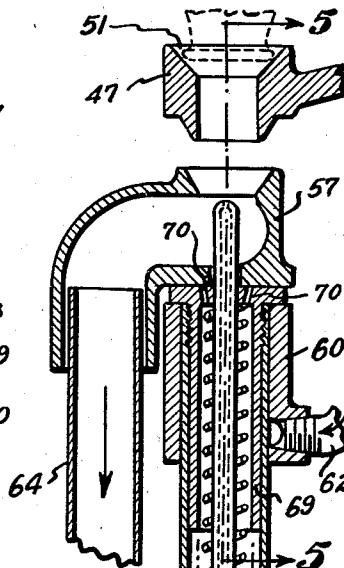


FIG. 4.

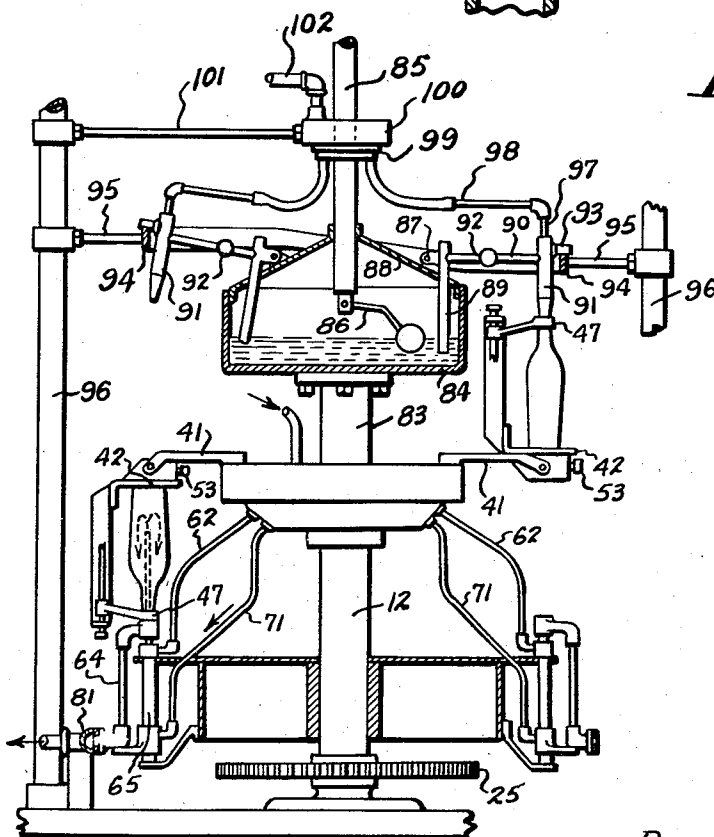


FIG. 6.

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2,298,475

MACHINE INCLUDING MEANS FOR CLEAN-
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8 Claims. (Cl. 226—68)

My invention has to do with the provision of means for cleaning containers (of which bottles will be taken as an exemplary embodiment), in an inverted position, and such means in combination with means for performing other functions on the bottles. Accordingly one of the objects of my invention is the provision of improved means for inverting bottles and for returning them to an upright position during a cycle of operation, and means for treating the bottles when in the several positions; and the ancillary objects of my invention will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications. Reference may therefore now be made to the drawings wherein:

Figure 1 is a plan view of one embodiment of my mechanism with parts cut away to show other parts.

Fig. 2 is an elevational view thereof, again with parts cut away to show other parts.

Fig. 3 is a vertical sectional view taken through the machine along the lines 3—3 of Fig. 2.

Fig. 4 is a sectional view of a mechanism for introducing cleaning fluid into the containers.

Fig. 5 is a partial sectional view of the same mechanism taken at right angles, namely along the lines 5—5 of Fig. 4.

Fig. 6 is a semi-diagrammatic elevational view with parts in section and with a large number of parts eliminated for the sake of clearness, showing the combination of my cleaning mechanism with a filling mechanism.

Briefly characterizing the exemplary embodiment of my machine, I provide a rotatable work table. Containers traveling along a conveyor are fed to this work table by a star-wheel or other suitable mechanism; and the containers are clamped by appropriate means on the work table. The containers are inverted by swinging the clamping means through substantially 180 degrees. This is accomplished by means of a cam track as will hereinafter be more fully described. While the bottles are in inverted position they are cleaned. After this the clamping mechanism is righted again through the action of the cam. The bottles are then either removed from the work table and returned to the conveyor or they are filled prior to their removal from the table, depending upon the functions desired in the completed machine.

Coming now to a specific description of an exemplary mechanism as shown in Figs. 1, 2 and 3, the machine has a suitable framework indicated generally at 1. A motor 2 is mounted on

the framework; and especially where a belt drive is employed it is well to mount the motor slidably for adjustment of belt tension. Also if the motor is slidably mounted a speed adjustment means in the nature of a Reeves drive may conveniently be employed. Accordingly, I have shown the motor slidably mounted on a pair of vertical rods 4. A threaded shaft 6 is journaled on the base and may be controlled by a hand wheel 7. The motor base 8 has a threaded portion 9 to receive the threaded end of the shaft; so that by adjusting the hand wheel 7, the motor may be moved up and down the rods 4.

I have shown a moving conveyor 10 traveling along the forward edge of the machine frame. No drive has been shown for this conveyor since the conveyor may be common to a plurality of machines. However, if this is not the case, a drive for the conveyor from the motor 2 or from another motor may readily be provided. I have designated a work table generally at 11. This work table is mounted on a revolving hollow shaft 12, mounted over a hollow post 13 of the machine, and upon suitable bearings such as the roller bearings shown in Fig. 3. The work table has a construction which will hereinafter be more fully described. A star-wheel 14 operated in timed relationship to the work table, serves in connection with a cooperating guide means 15 to transfer bottles or the like from the conveyor 10 to the work table. In Fig. 1 the conveyor 10 is indicated as moving toward the right. The star-wheel 14 has a counterclockwise rotation while the work table 11 rotates in a clockwise direction. Another star-wheel 16, cooperating with a guide 17 removes the bottles from the work table and repositions them upon the conveyor 10.

The parts hereinabove referred to are, or include, the main parts of the apparatus which are to be driven. The drive for these parts will now be briefly described. In the particular embodiment of my machine the motor 2 by means of a belt 18 drives a pulley 19 which is rotatable upon the shaft 20 of a gear box 21. The pulley 14 bears clutch teeth, as shown, and a cooperating toothed clutch member 22 is slidably splined to the shaft 20. When these clutch members are engaged the shaft 20 will be driven.

The construction of the gear box may be as desired, its purpose being primarily to give a suitable speed reduction. Ordinarily a worm drive is used. The driving shaft of the gear box is provided with a gear 23. This gear meshes with another indicated at 24 which is on a shaft bearing a gear 24a meshing with a ring gear indi-

cated at 25, which is attached to the sleeve 12. As a variant construction, the gear 25 could be made integral with the casting which forms the body of the work table 11; and the work table is driven in either way, as desired.

For driving the star-wheels the gear 24 meshes with another gear 26, which in turn meshes with a gear 27 on the shaft of the star-wheel 14. This gear is not fixed to the shaft of the star-wheel, but a safety mechanism is provided which will be referred to hereinafter. The star-wheel 14 on its shaft is positively geared to the star-wheel 16 on its shaft by gearing indicated at 28, 29 and 30 in Fig. 2.

In connection with the drive for the work table and the star-wheels I prefer to employ mechanism such as that set forth in the copending case of Stanley R. Rosendale, Serial No. 169,616, filed October 18, 1937. So far as this case is concerned it will be sufficient to point out as shown in Figs. 2 and 3, that on the shaft 31 of the star-wheel 14 I slidably spline a member 32 which has tapering teeth on it coacting with mating depressions in a collar on the gear 27. This acts, therefore, as a motion transmitting clutch between the gear 27 and the shaft 31; but if an unusual strain occurs on the star-wheel, as when a bottle jams, the member 32 will be forced downwardly and this drive disconnected. The member 32 is held in an engaged relationship by the end of a lever 33, pivoted on the frame of the machine and having at its other end a detent 34. A lever 35 operatively connected to a starting handle 36 bears a cooperating detent 37. The lever 35 is connected by a link 38 to a bell crank arrangement indicated generally at 39. One arm of the bell crank is connected to the drive clutch member 22. When the detents 34 and 37 are engaged, the clutch on the drive shaft 20 will be latched in engaged position. If a jam occurs, however, the member 32 will be forced downwardly and will cause the lever 33 to release the engagement of the detents. The clutch, therefore, is thrown out, there being provided for this purpose a suitable resilient means such as a spring, not shown. Also, a spring, not shown, urges the lever 33 into latching position. If the machine is stopped it may be started again by operating the handle 36. A stop handle 37 has an operative connection, not shown, with the lever 33, such that when the handle 37 is actuated the left hand end of the lever 33 will be raised and the detents disengaged so as to stop the machine. Since the star-wheel 14 is positively geared to the star-wheel 16 a jam occurring at the star-wheel 16 will also operate to depress the member 32, stop the star-wheels, and disconnect the main drive through the clutch 22 as described.

The work table is in the form of a hollow casting as most clearly shown in Fig. 3. This casting is bolted or otherwise fastened to the hollow sleeve 12. The casting is also journaled on a stationary ring 40 which is bolted or otherwise fastened to the machine frame. On the work table at the work stations I provide mounting members indicated at 41. To these mounting members I pivot container receiving mechanism consisting of bases 42 having integral standards 43. A pair of rods 44, 45 are slidably journaled on the standards. These rods bear bracket means 46 having perforated container top engaging means 47. At their bottoms the rods are provided with cam followers 48; and the rods are urged downwardly by springs 49 engaging between the cam follower brackets and the journals

for the rods on the standards 43. A cam 50 which may be common to the loading and unloading stations raises the rods 44, 45 at these stations, and therefore also raises the container engaging means 47. In operation, bottles are delivered onto the base 42 while the member 47 is raised. As the work table moves away from the loading station the rods are lowered by the cam so as to cause the member 47 to engage the tops of the containers and clamp them against the base 42. For this purpose the member 47 includes a centering bell as shown at 51 in Fig. 4. In order to adjust the apparatus for containers of different height, the member 46 may be moved on the rods and tightened in new positions by threaded tightening means indicated at 52 in Fig. 3.

Because the bottles or other containers are now tightly clamped between the base 42 and the member 47, the entire clamping mechanism thus far described may be swung about its pivot on the mounting means 41 so as to invert the bottles. The member 42 bears for this purpose a cam follower 53 which engages in a track on a cam member 54. The cam member 54 is so shaped that during the travel of the work table the clamping mechanism which is in engagement with the containers will be swung through an angle of 180 degrees from the upright position shown at the left in Fig. 3 to the fully inverted position shown at the right in the same figure. Where the machine is to be used only as a device for cleaning bottles, it will be usual so to proportion the cam 54 that the bottles are inverted when they arrive at a point of travel of the work table substantially opposite the loading station, and remain inverted for a sufficient length of travel of the work table to permit cleaning, being returned to normal or upright position by the time the containers reach the unloading station. But it will be clear that by otherwise proportioning the cam 54 the bottles may be inverted, cleaned, and returned to upright position during much less than the full travel of the work table. Hence a sufficient portion of the travel of the work table is left so that the containers may be filled or otherwise treated during the travel of the work table and while they are in upright position.

The mechanism for cleaning the bottles is generally shown most clearly in Fig. 3, Figs. 4 and 5 being details of the cleaning mechanism. A carriage 55 is slidably splined to the rotating sleeve 12. This carriage bears the cleaning mechanism. Its height may be adjusted by means of a threaded shaft 56 journaled on the sleeve 12 and engaged in a threaded portion of the carriage. The carriage is provided with this raising and lowering means so as to permit adjustment for varying heights of containers, as will be clear; and it will also be clear that the carriage and therefore the cleaning mechanism rotates with the work table.

Referring now to Figs. 4 and 5, an exhaust means 57 is first brought into contact with the clamping member 47, the two members just mentioned having cooperating tapered portions to make a reasonably tight joint. The exhaust member 57 is moved by air pressure. For this purpose it is connected by means of rods 58 with pistons 59 in small cylinders in the head 60 of a cleaning mechanism hereinafter to be described. The cylinders are connected together by a passageway 61 to which a conduit 62 is connected. Springs 63 serve to keep the exhaust member 57 in lowered position excepting when air under pres-

sure is admitted to the small cylinders. The exhaust member 57 has a sliding connection with an exhaust tube 64, as shown.

The head 60 is fastened to a cylinder 65. Within this cylinder a hollow cleaning spout or nozzle 66 forms the rod of a piston 67. Normally this piston is forced downwardly by a spring 68 in the cylinder. The upper end of the cylinder is closed by a sleeved member 69 which is perforated with small holes, as at 70, to relieve pressure above the piston 67. Hence when air under pressure is admitted to the lower end of the cylinder through a conduit 71, the piston will be forced upwardly causing the nozzle to pass through suitable perforations in the exhaust member 57 and through the perforation in the clamping member 47 and into the container therebeyond. The piston 67 carries a buffer or shock absorbing spring 72 which engages the end of the sleeved member 69 when the piston is thrust upwardly under air pressure. In cleaning, a blast of air is forced into the bottles or other containers through the spout 66, and the air so introduced is exhausted through the members 47 and 57, carrying with it any foreign matter which may be in the bottles. The cleaning mechanism thus far described may be resiliently mounted upon a bracket 73 on the carriage 55 by means of a rubber mounting 74 or its equivalent.

The hollow work table casting is shown in Fig. 3 as having an interior machined surface 75 against which bears a member 76, having a cooperatively machined surface. This member 76 is held stationary while the work table rotates as by being clamped at 77 against the stationary post 13. The various tubes 71 and 62 are connected to appropriate openings in the slanting portion of the work table casting 11, as shown. The member 76 acts through most of the travel of the work table to close off these openings, thus acting as a valve. However, at the cleaning station the member 76 has a valve opening 78 to which air is admitted under pressure from a suitable compressor, not shown, by means of a conduit 79. At the cleaning station, therefore, air under pressure is simultaneously admitted to tubes 71 and 62 and the cleaning action which I have described above occurs. As the containers move away from the cleaning station the member 76 again acts as a valve to cut off the air pressure. When the air pressure is released, of course, the spring 68 withdraws the spout 66 from the container and the springs 63 lower the exhaust member.

The brackets 73 also bear an exhaust fitting 80 of annular form to which the exhaust tubes 64 are attached. The exhaust fitting, of course, rotates with the work table and as it does so at the cleaning station, it turns against an exhaust manifold 81 attached to the frame of the machine. Air is exhausted from this manifold by means of a conduit 82, which may be open to the atmosphere through a separation device, or may be connected to an exhaust fan or the like.

The operation of cleaning the bottles will now be clear. As I have already indicated, other means for treating the bottles or containers may be incorporated in the machine. In Fig. 6 I have indicated an exemplary filling mechanism so incorporated. A standard 83 is fixed to the work table and bears a reservoir 84. This reservoir may be kept filled with the material which is to be introduced into the containers through a pipe 85 from a source of the material, not shown, the flow through the pipe being controlled by a float valve indicated generally at 86. Filler mecha-

nisms may be pivoted as at 87 to a cover 88 for the reservoir which rotates therewith, so that these filler mechanisms are carried around with the containers on the work table.

This is an exemplary showing, and modifications may be made in it. Thus the filling stems could be mounted in tracks attached to the cover 88 of the reservoir and thus constrained to move vertically by the cam mechanism hereinafter set forth. The inlet tubes 89 and 90, and the check valve 92 will, of course, move with the filling tubes and in a vertical plane.

The filler mechanisms in the exemplary embodiment comprise each a tube 89, which extends downwardly into the material in the reservoir, and a cross tube 90 which connects the tube 89 with a filling head indicated generally at 91. The tube 90 will preferably be provided with a check valve 92. The filling head has an end portion adapted to enter the bottles through the perforation in the clamping member 47. In order to raise and lower the filling mechanisms about the pivots 87 I provide each of them with a cam follower 93 which engages a cam 94. The cam is stationary while the filling heads move; and I have shown the cam supported by means of rods 95 on standards 96 which are fixed to the frame of the machine, although the cam may be otherwise supported if desired. An exhaust tube 97 passes down through each of the filling heads and has communication with the interior of the containers. These tubes are connected by conduit means 98 to a rotating valve plate 99. This plate bears against a stationary valve member 100 shown as held by a rod 101 to the standard 96. An exhaust connection to the valve plate 100 is shown at 102. The valve arrangement is such as to connect the exhaust line 102 with the exhaust tube 97 of any particular filling head 91 only when that filling head is in filling position. The exhaust connection when so effectuated removes air from the containers and in doing so causes the filling material in the reservoir 84 to be drawn up through the tubes 89 and 90, and introduced into the containers through the filling head. Excess material introduced into the containers will be withdrawn through the exhaust tube 97, so that the containers cannot be overfilled. There will be no filling action, of course, until the exhaust connection is effectuated.

It will be understood that modifications may be made in my invention without departing from the spirit of it.

Having thus described my invention in certain exemplary embodiments, what I claim as new and desire to secure by Letters Patent, is:

1. In a machine of the character described, a work table, clamping means for containers pivoted to said work table, means for turning said clamping means about said pivot whereby to invert said containers, means for delivering containers to said work table and removing them therefrom, means operative in connection with said last mentioned means for actuating said clamping means to engage and release said containers, means operative in connection with said work table to clean said containers when in inverted position, said cleaning means comprising exhaust means, means for bringing said exhaust means into communication with said containers, and means operating through said exhaust means for introducing gas under pressure into said containers.

2. In a machine of the character described, a rotating work table, means for delivering con-

tainers to said work table, clamping means for said containers pivoted to said work table, means operative during the movement of said work table to invert said clamping means whereby to invert said containers, means operative to clean said containers when inverted, means for returning said clamping means to original position, said means including a tube, and fluid pressure means for projecting said tube upwardly into said containers, and means for filling said containers after their return to original position.

3. In a machine of the character described, a rotating work table, clamping means for containers pivoted to said work table, cam means effective during movement of said work table to engage and release containers in said clamping means, means for inverting said clamping means whereby to invert said containers and for returning said containers to upright position on said work table, means movable with said work table for introducing dry gas into said containers when inverted so as to clean said containers, means operative in connection with the movement of said work table acting as a valve for said gas, exhaust means for said containers, and means acting in connection with the movement of said work table as valve means for said exhaust means.

4. In a machine of the character described, a rotating work table, mounting means on said work table, clamping means for containers pivoted to said mounting means, stationary cam means for releasing and engaging said clamping means, a stationary cam track member for engagement with said clamping means and operative to invert and return said clamping means during movement of the work table, fluid pressure cleaning means movable with said work table and means operative to bring said fluid pressure cleaning means into cleaning engagement with said containers when said containers are inverted, said fluid pressure means comprising an exhaust fitting, means to bring said fitting into communication with said containers, a tube, and fluid pressure means for projecting said tube upwardly through said fitting and into said containers.

5. In a machine of the character described, a rotating work table, mounting means on said work table, clamping means for containers pivoted to said mounting means, stationary cam means for releasing and engaging said clamping means, a stationary cam track member for engagement with said clamping means and operative to invert and return said clamping means during movement of the work table, fluid pressure cleaning means movable with said work table and means operative to bring said fluid pressure cleaning means into cleaning engagement with said containers when said containers are inverted, said means comprising connections between said fluid pressure cleaning means and said work table, and a stationary valve plate operative in connection with said work table for admitting fluid under pressure to said fluid pressure cleaning means upon rotation of said work table, rotatable exhaust means in connection with

said cleaning means and a stationary exhaust manifold in connection therewith.

6. In a device of the character described, pivoted clamping means for containers, comprising a base, a standard on said base, and perforated means for engaging the tops of containers slidably mounted on said standard, whereby said containers may be clamped between said base and said last mentioned perforated means, means for swinging said clamping means about said pivot whereby to invert said containers and return them to normal position, and successively acting means operative through and forming sealing connection with said perforated top engaging means for cleaning said containers while in inverted position with dry gas, and for introducing material into said containers after they have been returned to upright position.

7. In a machine of the character described, a work table, clamping means for containers pivoted to said work table, means for turning said clamping means about said pivot whereby to invert said containers, means for delivering containers to said work table and removing them therefrom, means operative in connection with said last mentioned means for actuating said clamping means to engage and release said containers, means operative in connection with said work table to clean said containers when in inverted position, said cleaning means comprising exhaust means, means for bringing said exhaust means into communication with said containers, and means operating through said exhaust means for introducing gas under pressure into said containers, said last mentioned means comprising a tube, and means for projecting said tube into said containers.

8. In a machine of the character described, a rotating work table, mounting means on said work table, clamping means for containers pivoted to said mounting means, stationary cam means for releasing and engaging said clamping means, a stationary cam track member for engagement with said clamping means and operative to invert and return said clamping means during movement of the work table, fluid pressure cleaning means movable with said work table and means operative to bring said fluid pressure cleaning means into cleaning engagement with said containers when said containers are inverted, said means comprising connections between said fluid pressure cleaning means and said work table, and a stationary valve plate operative in connection with said work table for admitting fluid under pressure to said fluid pressure cleaning means upon rotation of said work table, rotatable exhaust means in connection with said cleaning means and a stationary exhaust manifold in connection therewith, said fluid pressure cleaning means including a tube, and means for projecting said tube upwardly through said exhaust means and into said containers.

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