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APPARATUS FOR WASHING BOTTLES

Filed Oct. 20, 1924

3 Sheets-Sheet 1

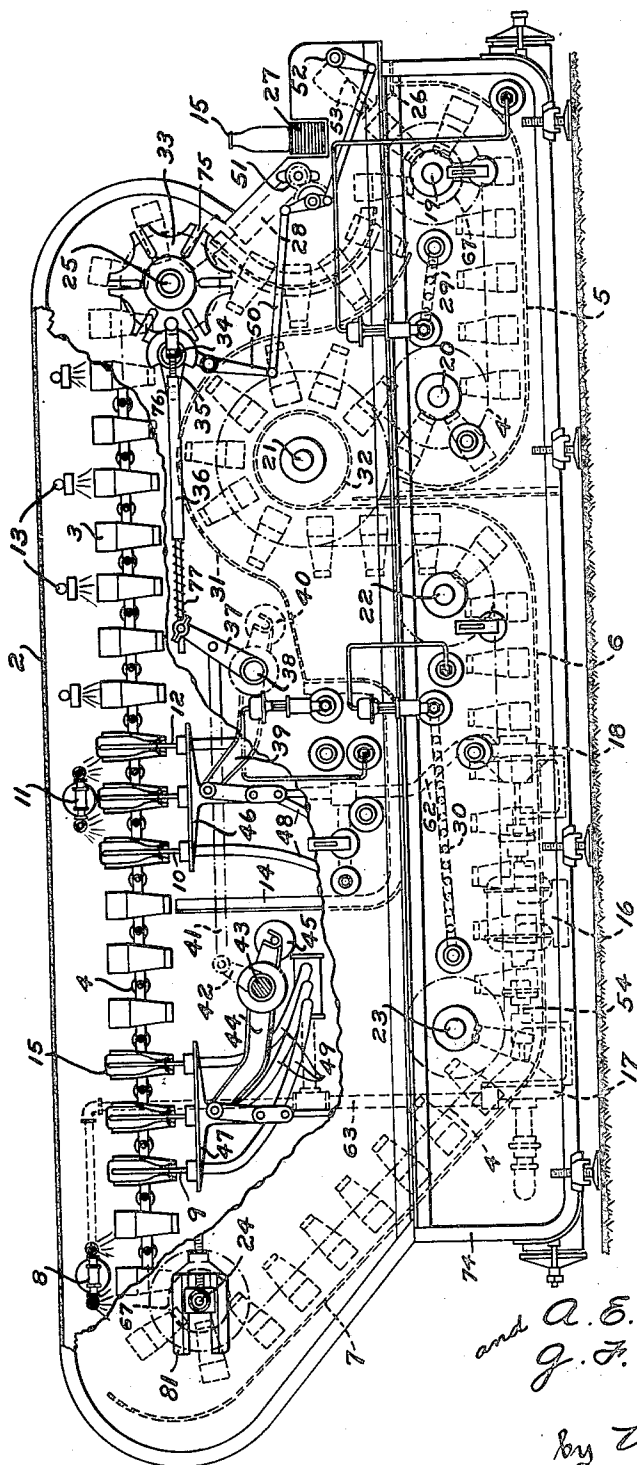


Fig. 1

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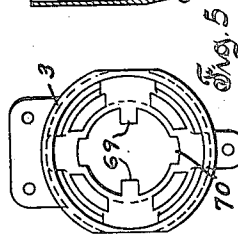
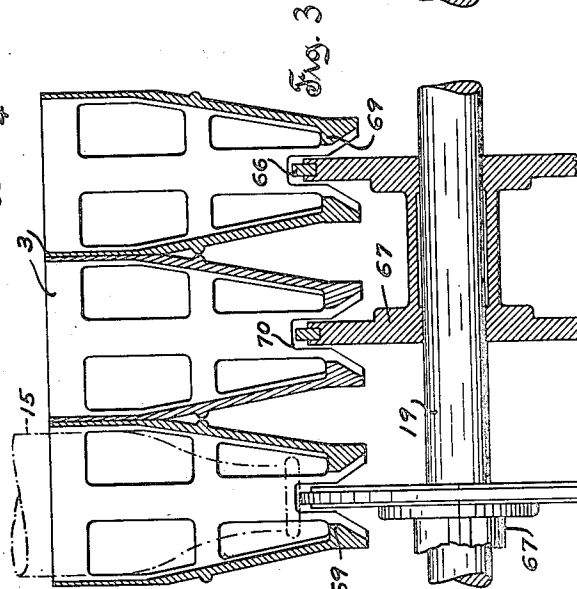
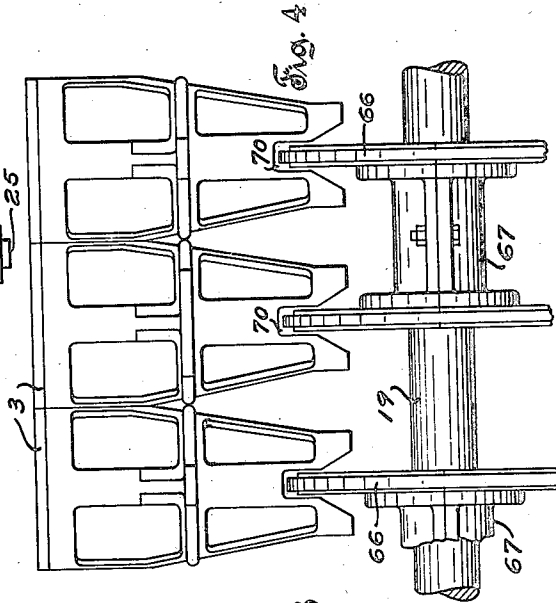
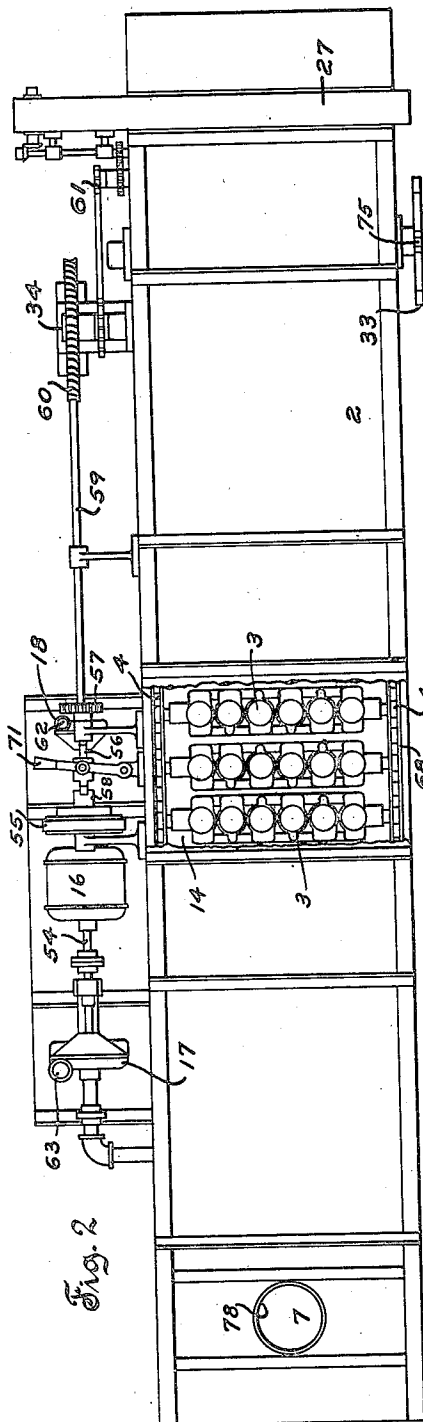
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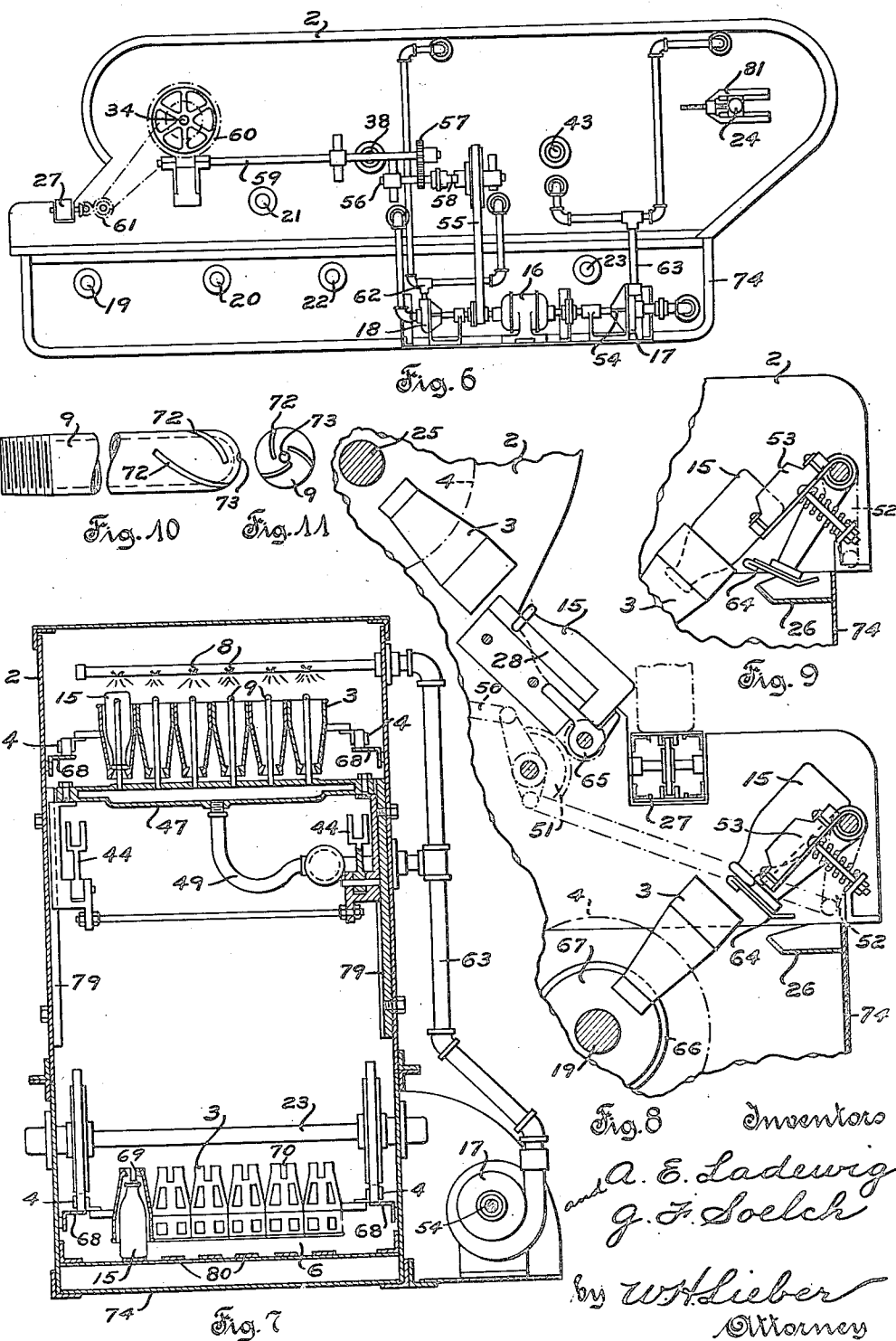
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UNITED STATES PATENT OFFICE

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APPARATUS FOR WASHING BOTTLES

Application filed October 20, 1924. Serial No. 744,594.

This invention relates in general to improvements in the art of cleaning similar objects in succession, and relates more specifically to an improved apparatus for washing
5 receptacles such as bottles.

An object of the invention is to provide simple and efficient apparatus for automatically and thoroughly cleansing successive objects such as bottles.

10 In the art of automatically cleansing receptacles prior to packing various commodities therein, most receptacles may be readily and sufficiently cleaned by merely subjecting them to a spray of cleansing fluid. Such
15 washing is not however sufficient to thoroughly clean receptacles such as milk bottles, especially when such bottles have previously been filled with milk. The present invention contemplates provision of an improved
20 apparatus for automatically and effectively washing and sterilizing milk bottles and the like wherein the application of ordinary spray washing is insufficient.

Some of the more specific objects and advantages of the present improvement, are as follows:—

To provide compact and efficient apparatus for automatically subjecting successive receptacles to combined bath and spray washing.

30 To provide a sanitary bottle washing machine wherein the bottles are entirely enclosed during the cleansing operation, and all parts of which are readily accessible for inspection and cleaning.

35 To provide a receptacle washing device which is entirely automatic in operation and wherein a single driving motor serves to operate the bottle transporting mechanism, the spray nozzles and the pumps which supply
40 the nozzles with washing liquid.

To provide improved means for removing liquid and solid impurities from dirty bottles admitted to a washer, prior to delivery of the bottles to the bath of cleansing liquid.

45 To provide improved mechanism for effectively removing fatty deposits from glass bottles and the like.

To provide an improved bottle washer nozzle structure.

50 To provide various improvements in the

details of construction and operation of bottle washing machines, whereby the cost of construction of such devices is reduced to a minimum and the efficiency thereof is enhanced to a maximum.

These and other objects and advantages of the invention will be apparent in the course of the accompanying description.

While the invention is specifically described herein as being applied in a machine
60 for automatically washing glass milk bottles of standard construction, it will be obvious that the novel principles are capable of more general application and the specific disclosure should not be considered as an intent to
65 limit the scope of the claims.

A clear conception of the various steps of the improved details of construction of one type of apparatus embodying the invention, may be had by referring to the drawings accompanying and forming part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a somewhat diagrammatic part
75 sectional side elevation of an improved automatic milk bottle washing machine.

Fig. 2 is a fragmentary part sectional top view of the improved automatic milk bottle
80 washing machine.

Fig. 3 is an enlarged central section through several of the bottle carriers and a fragment of several of the buffer wheels cooperating therewith.

Fig. 4 is an enlarged side elevation of several of the bottle carriers and a fragment of several of the buffer wheels cooperating
85 therewith.

Fig. 5 is an enlarged top view of one of the
90 bottle carriers.

Fig. 6 is an elevation of the improved automatic milk bottle washing machine looking toward the driving side thereof.

Fig. 7 is a transverse vertical section
95 through the improved automatic milk bottle washing machine.

Fig. 8 is an enlarged fragmentary side view of the bottle supply and discharge mechanism of the improved automatic milk bottle
100 washing machine.

Fig. 9 is an enlarged fragmentary side view of the bottle supply mechanism of the improved automatic milk bottle washing machine.

Fig. 10 is a fragmentary enlarged side view of an improved spray nozzle for bottle washing machines.

Fig. 11 is an enlarged end view of an improved spray nozzle for bottle washing machines.

The improved automatic milk bottle washing machine specifically illustrated in the drawings, comprises in general a main housing or enclosing casing consisting of a base section 74 and a top section 2; an endless series of rows of bottle carriers 3 transportable along a definite course within said casing by means of conveyor roller chains 4; an initial or primary soaking and bath washing basin 5 located near the inlet end of the base section 74; a final or secondary soaking and bath washing basin 6 located near the discharge end of the base section 74; external washing spray nozzles 8 located within the top section 2 above the basin 6; internal washing spray nozzles 9 located within the top section 2 above the basin 6; a rinsing water basin 14 located in the top section 2 above the basin 6; external rinsing spray nozzles 11 located within the top section 2 above the basin 14; internal rinsing and sterilizing spray nozzles 10, 12 respectively located within the top section 2 above the basin 14; final external cooling spray nozzles 13 located within and near the discharge portion of the top section 2; bottle supply and discharge mechanisms; and means for intermittently moving the bottle carriers 3, for supplying fluid to the various nozzles, and for actuating the various mechanisms.

Each row of bottle carriers 3 comprises six or more carriers each having inwardly projecting oppositely disposed lugs 69 adapted to engage the open end of a milk bottle 15 while inverted, and also having a slot 70 extending transversely between the lugs 69, see Figs. 3, 4, 5 and 7. The rows of carriers 3 are secured to transverse bars the ends of which are attached to the chains 4. The conveyor chains are definitely guided within the casing by means of idler sprockets associated with the shafts 19, 20, 21, 22, 23 and 24 and driving sprockets associated with the driving shaft 25, and by means of rails 68 shown in Fig. 7. The bottles 15 are retained within the carriers 3 when the latter are partially or completely inverted, by means of retaining strips 80 and plates 32, 7 the former of which is shown in Fig. 7 and the latter of which are shown in Fig. 1. The tension of the conveyor chains is variable by means of slack adjusters 81 associated with the shaft 24 and the shafts 19, 24 are preferably provided with buffer wheels 67 having annular peripheral

rubber buffer strips 66 adapted to enter the slots 70 of the carriers 3.

The primary soaking and bath washing basin 5 contains a strong solution of dirt removing liquid the level of which extends well above the bottles 15 being transported horizontally through the basin 5, this liquid being heated by steam or hot water admitted through the coil 29. The secondary soaking and bath washing basin 6 contains a weaker but hotter solution of liquid the level of which extends well above the bottles 15 being transported horizontally through the basin 6, this liquid being heated by steam or hot water admitted through the coil 30. The self adjusting plate 7 is inclined as shown in order to cause the bottles 15 delivered from the basin 6 to retain liquid from the basin until after the carriers 3 are inverted at the shaft 24. The nozzles 8, 9 are supplied with liquid from the basin 6, by means of a centrifugal pump 17 delivering through a discharge pipe 63 and flexible feed pipes 49 the latter of which communicate with a vertically movable header 47 which supports the nozzles 9. The rinsing nozzles 10, 11 are supplied with relatively clean liquid from the basin 14, by means of a centrifugal pump 18 delivering through a discharge pipe 62 and flexible feed pipes 48 the latter of which communicate with a vertically movable header 46 which supports the nozzles 10, 12. The nozzles 12 may be supplied with final sterilizing steam or liquid from an independent source. The cooling nozzles 13 may be supplied with relatively cool water from any convenient source in an obvious manner.

The main driving motor 16 is direct connected to both of the centrifugal pumps 17, 18 by means of a shaft 54 which drives a counter shaft 56 through belt gearing 55. A clutch 58 operable by a lever 71 serves to control the connection of the belt gearing 55 with the shaft 56. A second counter shaft 59 is drivingly connected to the counter shaft 56 by means of spur gearing 57 and is also drivingly connected to one end of a transverse driving shaft 34 by means of worm gearing 60, see Fig. 6. The opposite end of the transverse shaft 34 carries a revolving crank 35 having a pin 76 which is adapted to successively engage the radial slots 75 of a Geneva star wheel 33 secured to one end of the driving sprocket shaft 25, see Fig. 1. The shaft 34 also has a crank which is connected to nozzle actuating arms 37, 42 by means of rod connections 36, 41, the former of which is variable in effective length by virtue of a compression spring 77. The shaft 34 additionally carries a cam of ordinary construction for periodically moving the bottle supply and delivery mechanism through linkage 50 as will be later explained.

The movable internal spray nozzles 9, 10, 12 are preferably formed of tubes with central

upper end orifices 73, and spiral slots 72 surrounding the orifices 73. The slots 72 are of such length and pitch that they overlap each other as shown in Figs. 10 and 11. The nozzles 10, 12 are carried by the header 46 which is vertically reciprocable by means of an actuating arm 39 supported upon a pivot shaft 38 to one end of which the actuating arm 37 is also connected. The weight of the nozzles 10, 12 and of the header 46 is counter-balanced by means of weights 40. The nozzles 9 are carried by the header 47 which is vertically reciprocable by means of an actuating arm 44 supported upon a pivot shaft 43 to one end of which the actuating arm 42 is connected. The weight of the nozzles 9 and of the header 47 is counter-balanced by means of weights 45, see Fig. 1. The headers 46, 47 are movable in guides 79 secured to the casing section 2.

The dirty bottles 15 are delivered to a resiliently supported inclined supply plate 53 having guides for properly directing the bottles toward the carriers 3. A stop plate 64 which is movable by means of an oscillatory arm 52 provides a support for the bottles 15 while resting upon the plate 53. The lower edge of the stop plate 64 is disposed above a drain trough 26 shown in detail in Figs. 8 and 9. The clean bottles are discharged from the machine by means of discharge elements 65 which are intermittently oscillable between inclined guide plates 28 by gearing 51. The gearing 51 and the arm 52 are operable from the driving shaft 34 through the linkage 50, in an obvious manner. A transversely disposed discharge conveyor 27 which is driven by means of gearing 61 shown in Fig. 6, cooperates with the elements 65 to remove the clean bottles 15 from the machine.

The main casing or housing besides being provided with suitable normally covered openings for permitting access thereto, has a vapor discharge stack 78 and a guard plate 31 for preventing escape of injurious vapors toward the front end of the machine. The casing is also provided with thermometers for determining the temperature of the liquid within the basins 5, 6, 14 and with steam feed regulators of well known structure. The entire machine may be mounted upon adjustable supports and the basins 5, 6, 14 are provided with suitable drains.

During normal operation of the machine the motor 16 is operating to simultaneously drive the pumps 17, 18 and the various actuating mechanisms. The dirty bottles are placed in inverted position between the guides of the supply plate 53 while the stop plate 64 is in upper position as shown in Fig. 8, thus permitting any liquid contained by the bottles, to flow down the plate 64 and into the trough 26 from whence it is drained to the sewer. After the bottles have thus been drained, the

plate 64 is automatically moved downwardly to the position shown in Fig. 9, whereupon the bottles 15 are free to slide by gravity into the carriers 3 radiating from the idler shaft 19, and against the buffer wheels 67. After the bottles 15 have been thus delivered to the carriers 3, the stop plate 64 is automatically returned to the position shown in Fig. 8 and the loaded carriers 3 are advanced step by step until the dirty bottles are completely immersed in the liquid in the basin 5. As the Geneva gearing continues to advance the bottles horizontally through the basin 6, the dirt is soaked and dissolved by the strong solution after which the bottles are removed from the basin 5, drained and subsequently delivered to the basin 6 by means of the sprockets carried by the idler shaft 21. When the bottles have been immersed in the liquid in the basin 6, they are advanced horizontally therethrough and are simultaneously subjected to final soaking. At the end of the basin 6, the sprockets carried by the shafts 23, 24 and the inclined plate 7 cooperate to elevate the bottles while they remain substantially filled with the liquid from the basin 6. When passing around the shaft 24 the carriers 3 and the bottles 15 therein are inverted and the liquid is precipitated therefrom over the bottles which are being advanced up the inclined plate 7.

While traveling between the shafts 24, 25 in inverted position, the bottles 15 are successively subjected to external washing by the spray nozzles 8, to three independent internal washings by the spray nozzles 9, to external rinsing by the spray nozzles 11, to two independent internal rinsings by the spray nozzles 10, to internal sterilizing by the nozzles 12 and to a cooling action by the spray nozzles 13. The internal spray nozzles 9, 10, 12 are automatically raised and lowered while the carriers 3 and the bottles 15 are stopped thereabove, and each of the bottles is subjected to eight independent external and six independent internal treatments during its travel across the top of the machine. The successive clean bottles are carried around the shaft 25 and inverted by the sprockets associated with this shaft, and are eventually delivered from the carriers 3 upon the discharge chutes 28, by gravity. From the chutes 28, the elements 65 periodically remove the clean bottles 15 to the conveyor 27 which automatically carries the bottles toward the side of the machine. It will thus be noted that the successive bottles 15 delivered to the machine are effectively cleaned by the successive bath and spray washings to which they are subjected.

Due to the sudden starting and stopping of the conveyor chain 4 by the Geneva gearing, the liquid filled bottles passing up the self adjusting incline 7 are thoroughly shaken or agitated thus enhancing the cleansing action of the liquid. By forming the internal noz-

zles 9, 10, 12 as shown in Figs. 10 and 11, jet treatment of the entire interiors of the bottles is assured due to the overlapping formation of the slots 72. The buffer wheels 67, the resiliently supported plates 53 and the guide rails 80 prevent breakage of the bottles 15 when being admitted to the machine and during reversal thereof, and the elements 65 may also be provided with cushioning pads in order to eliminate breakage.

The single motor 16 besides operating both pumps 17, 18, drives all of the moving parts of the machine. The Geneva gearing and the mechanisms connecting the driving shaft 34 with the movable nozzles 9, 10, 12, the elements 65, the movable stop plate 64, and the conveyor 27, are so constructed that each part functions periodically at the proper time and all operations are performed automatically. The operation of the machine is readily visible from the exterior through windows and the various thermometers and regulators permit proper control of the treating fluids. The drain trough 26 and the stop plate 64 effectively remove liquid from the dirty bottles, thereby preventing dilution and pollution of the liquid in the basin 5.

It should be understood that it is not desired to limit the invention to the specific details of construction of the apparatus herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:—

1. In combination, a basin having liquid therein, a conveyor for transporting bottles through the liquid in said basin, intermittently operable means for delivering bottles to said conveyor in partially inverted position, and a trough beneath said means adapted to receive drainage from said bottles while held in said means.

2. In combination, a basin adapted to contain liquid, and an intermittently actuated endless conveyor for carrying bottles through said liquid for treatment thereby, said conveyor having a portion of its path of travel positioned to submerge the bottles in said liquid, and having a succeeding portion of its path rising out of said liquid on an inclined plane of such angular relation to horizontal as to maintain said bottles substantially filled with liquid after emergence therefrom, said inclined path extending a sufficient distance outwardly of said liquid to permit a plurality of stops of said intermittently actuated conveyor while a bottle carried thereby is traveling said distance.

3. In combination, a bottle washing basin adapted to contain liquid, conveying means in said basin for carrying bottles into and out of said liquid, bottle receiving means mounted on said basin arranged for the manual deposit of bottles thereon, automatic

means for periodically permitting the bottles to pass from said receiving means to said conveying means, and a trough positioned beneath said receiving means for collecting drainage from said bottles while at rest upon said receiving means.

4. In combination, a conveyor having a successive series of carriers adapted to receive and support bottles, said carriers having a longitudinally slotted end portion, means for directing bottles into said carriers by gravity, a support in relatively stationary relation to the movement of said carriers, and a resilient buffer mounted on said support in position to be received within said longitudinal slot during the successive movement of said carriers and adapted to receive the impact of said bottles when deposited in said carriers.

In testimony whereof, the signatures of the inventors are affixed hereto.

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