Feb. 15, 1938. A. E. LADEWIG ET AL 2,108,227

BOTTLE WASHING MACHINE

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Fig. 1.

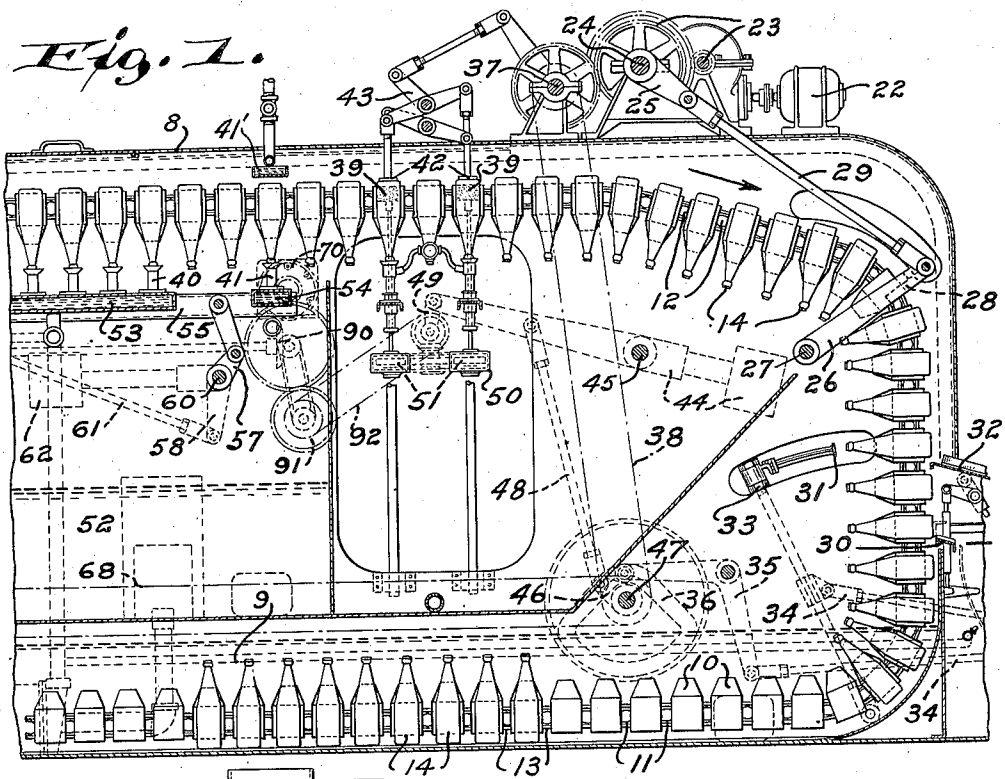
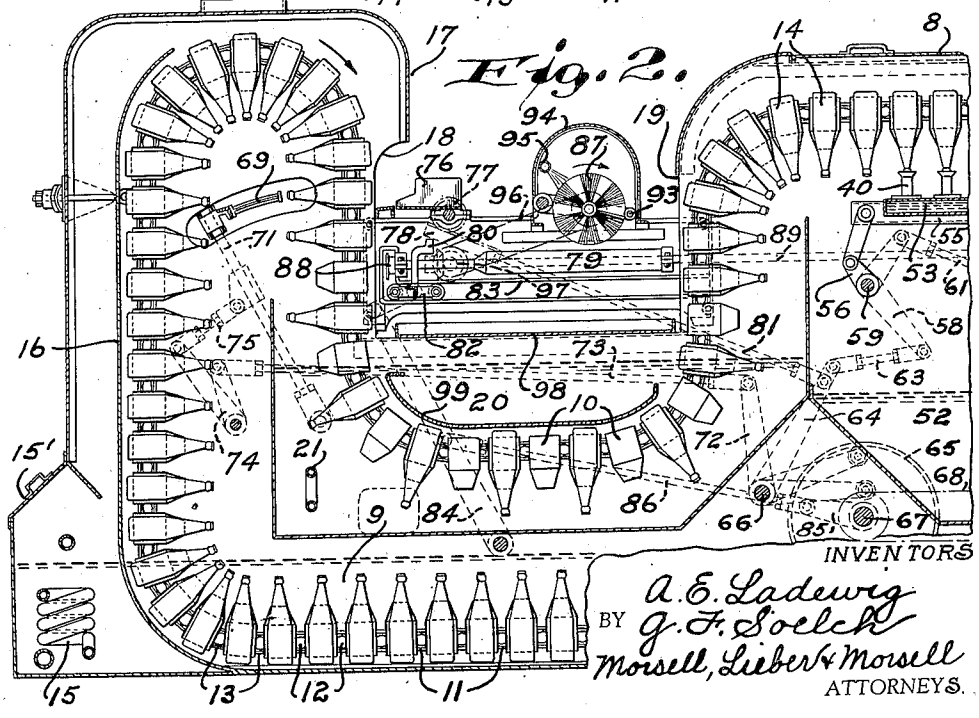


Fig. 2.



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Fig. 3.

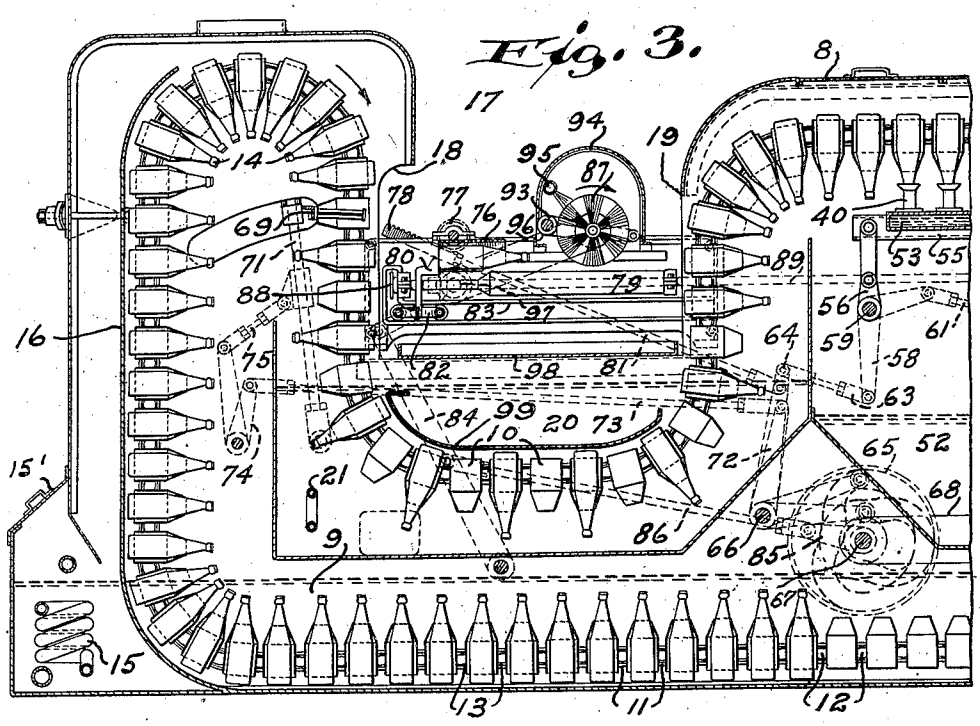
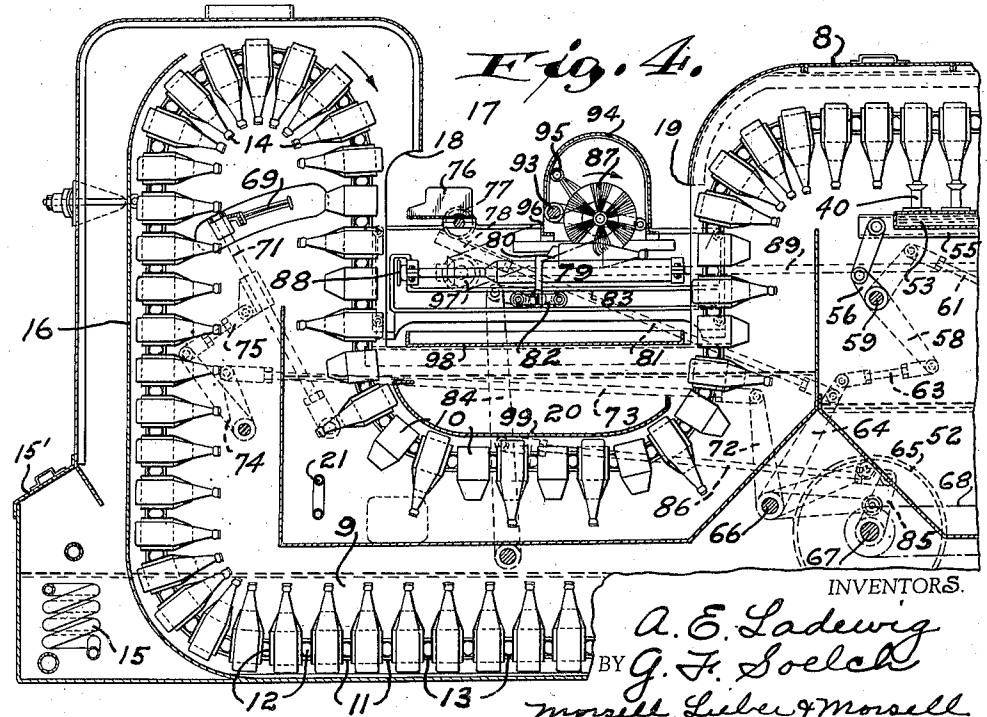


Fig. 4.



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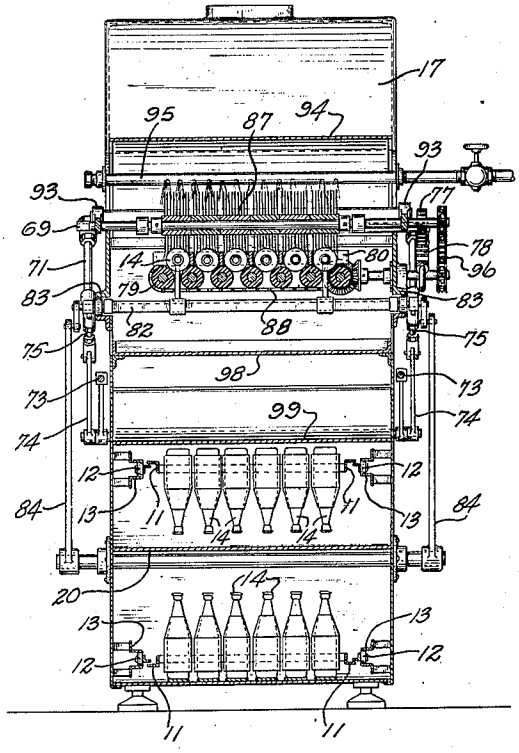
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Fig. 5.



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BOTTLE WASHING MACHINE

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Application February 25, 1935, Serial No. 8,042

7 Claims. (Cl. 15—61)

The present invention relates to improvements in the construction and operation of machinery for mechanically cleansing or washing a succession of objects such as a series of bottles or the like.

Generally defined, an object of the invention is to provide an improved bottle washing machine which is automatic and highly efficient in operation.

Some of the more important specific objects of the present invention may be enumerated as follows:—

To provide improved mechanism for removing labels and for otherwise cleansing the exteriors of successive containers such as bottles during transportation thereof along a definite path.

To provide an improved washer for relatively small necked bottles, which will automatically and effectively cleanse both the interiors and exteriors of such bottles in succession and with minimum danger of breakage.

To provide improved mechanism for effecting temporary removal of the bottles from the carrier racks or pockets of a bottle conveyor, and means for cleansing the pockets during the period of removal of the bottles therefrom.

To provide improved instrumentalities for brushing the external surfaces of circular or cylindrical containers, in succession, during cyclic transportation of the containers along a definite course through a washing machine or the like.

To provide improved means for removing successive bottles of a series from within and for subsequently returning the bottles to the enclosing housing of a bottle washing machine, before final discharge of the washed bottles from the enclosure.

To provide improved structure for eliminating undesirably rapid pollution of the soaking liquid in a bottle washing machine, by labels and other deposits adhering to the external surfaces of the successive bottles.

To provide improved mechanism for effecting periodic removal of successive or selected objects such as bottles from a conveyor, while permitting continued movement of the conveyor and transportation of other objects of the series.

To provide an improved bottle cleansing assemblage which is compact and durable in construction, and which is moreover thorough and effective in normal use.

These and other specific objects and advantages will be apparent from the following detailed description.

A clear conception of embodiments of the several features constituting the present invention, and of the mode of constructing and of operating bottle washing machines built in accordance with the improvement, may be had by referring to the drawings accompanying and forming a 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 longitudinal vertical section through the forward loading and unloading end of a bottle washing machine, showing the main drive and the major portion of the bottle interior washing mechanism;

Fig. 2 is a similar section through the rear end of the same bottle washing machine, showing the bottle exterior scrubbing mechanism just after delivery of a bottle therefrom and preparatory to the reception of a subsequent bottle;

Fig. 3 is a similar section through the rear end of the machine showing a bottle just after transfer thereof to the external scrubbing mechanism;

Fig. 4 is another similar section through the rear end of the same machine showing a bottle being scrubbed externally; and

Fig. 5 is a transverse vertical section through the washer taken through the center of the outside scrubbing brush.

While the invention has been shown herein as being specifically applied to a machine especially adapted to automatically convey and wash a continuous series of beer bottles advancing by steps equal to twice the distance between successive rows of the bottles, it is not intended to unnecessarily restrict the scope by such specific embodiment, since some of the improved features may obviously be more generally applied to other assemblages.

Referring to the drawings, the improved beer bottle washer shown therein comprises in general, a main housing or casing 8 having a soaking liquid basin 9 in the lower portion thereof; an endless conveyor consisting of successive transversely extending rows of bottle carrier pockets 10 supported by a pair of laterally spaced endless chains 11 having spaced rollers 12 coacting with fixed side rails 13 mounted upon the opposite side walls of the casing 8 in a well known manner; mechanism for intermittently advancing the conveyor pockets 10 by successive steps each equal to twice the distance between the successive pocket rows; mechanism at the front end of the casing 8 for delivering the dirty bottles 14 to and for discharging the washed bottles 14 from the conveyor; washing and rinsing mechanism for the interiors of the bottles 14, disposed

within the main casing 8; and improved mechanism for removing the bottles 14 from the pockets 10 and casing 8, and for subsequently scrubbing the bottle exteriors and returning the same to the conveyor within the housing.

The main casing 8 which is preferably formed of sheet metal, is of relatively rigid construction, and may be provided with one or more heating coils 15 for the soaking liquid in the basin 9. These coils 15 are accessible and bodily removable from the casing 8 through a rear cover 15' coacting with an end extension at the rear of the main housing. The endless bottle conveyor is adapted to travel in the direction indicated by the arrows in the several views, and when the bottles 14 are being transported through the basin 9, they are positioned with their heads uppermost and rest upon slides at the bottom of the basin 9. After leaving the basin 9 at the extreme rear end of the machine, the conveyor path extends upwardly along a rear plate 16, and reverses as shown in Figs. 2, 3, and 4, at the upper end of this plate. The subsequent portion of the conveyor path is U-shaped, and the main casing 8 at this U-shaped path portion, is provided with a transverse recess 17 and with opposed openings 18, 19 at the rear and front ends respectively, of the recess 17. The lower part of the U-shaped conveyor path portion, passes through an auxiliary liquid basin 20 mounted within the rear portion of the casing 8 above the basin 9, and the basin 20 may also be provided with one or more heating coils 21. Beyond the U-shaped portion, the path of the conveyor runs forwardly within the upper interior of the casing 8 in a substantially horizontal direction, and it should be noted that while the pockets 10 are traversing the downwardly and upwardly extending legs of the U, the bottles 14 are horizontally disposed but oppositely directed, and when the pockets 10 are moving along the lower portion of the U and along the upper casing interior beyond the U, the bottles 14 are inverted. The final foremost portion of the conveyor path at the bottle unloading and loading mechanism, travels downward as shown in Fig. 1, and connects with the lowermost path portion, thereby making the course continuous.

The mechanism for normally driving the machine so as to intermittently advance the several rows of conveyor pockets 10 by steps equal to twice the distance between the central planes of the successive pocket rows, comprises a driving motor 22 coacting through gearing 23 with a transverse drive shaft 24 mounted in bearings upon the main casing 8; a crank 25 secured to the shaft 24 and having a throw approximately equal to twice the distance between successive pocket rows; an oscillatory arm 26 swingably supported upon a pivot shaft 27 and carrying pivoted pawls 28 at its swinging end, which are cooperable with alternate sets of conveyor rollers 12; and a connection 29 for imparting the motion of the crank 25 to the pawls 28 to intermittently swing the latter back and forth about the pivot shaft 27. The coaction between the pawls 28 and rollers 12 is such, that when these pawls 28 are moving forwardly, all of the conveyor pockets 10 are being simultaneously advanced, and when the pawls are swinging rearwardly, all of the pockets remain at rest. This conveyor propelling mechanism therefore insures transportation of all bottles 14 through two successive trips around the endless conveyor path before final delivery of the bottles from the casing 8.

The loading and unloading mechanism for delieving the dirty bottles 14 to and for discharging the washed bottles from the conveyor pockets 10, constitutes no part of the present invention, and may be of the type shown in copending application Serial No. 179,424, filed March 30, 1927, which has matured into Patent No. 2,051,090, issued August 18, 1936. Only a portion of this mechanism which is associated with the front end of the casing 8, is illustrated in Fig. 1, and the dirty bottle loading mechanism includes a bar 30 over which the successive bottles 14 are delivered into the rows of empty pockets 10, with the bottles in substantially horizontal position and their open ends rearmost. The automatic bottle unloading mechanism includes an oscillatory pusher 31 adapted to engage the heads of the clean bottles 14 and to push the same from their carrier pockets 10 upon tiltable racks 32 which right the cleansed bottles and deliver the same to conveying structure not shown. The pusher 31 is carried by oscillatory side arms 33 of well known construction customarily located one on each side of the casing 8 and which are swingable through linkage 34 which also actuates the loading mechanism and the righting racks 32, and the linkage 34 is normally driven by a bell crank 35 coacting with a cam 36 drivingly connected to a counter shaft 37 by a chain drive 38. The counter shaft 37 is geared to the main drive shaft 24, and the motor 22.

The mechanism for normally washing and rinsing the interiors of the bottles 14 as they are being transported twice around the conveyor path, is likewise shown in Figs. 1 and 2, and comprises two transverse rows of vertically movable brushes 39 which are cooperable with the interiors of the bottles during their initial trip around the endless path; a series of transverse rows of jet producing washing nozzles 40 which are cooperable with all bottles 14 traversing the upper stretch of the conveyor path; and a single transverse row of jet producing rinsing nozzles 41 cooperable only with the finally washed bottles shortly prior to final delivery thereof from the machine. When the bottles are being acted upon by the brushes 39, they should be held down into their carrier pockets 10, and two transverse rows of stops 42 which are operable by linkage 43 cooperating with the countershaft 37, are provided for this purpose. The brushes 39 are vertically movable to enter and leave the lower open bottle ends, by means of a counter-weighted lever 44 swingably supported upon a pivot shaft 45 and oscillatable by a crank 46 mounted upon the cam shaft 47, through a connecting link 48. The swinging end of the lever 44 is connected by means of a short link 49 to the brush support 50, and the brushes 39 may be rotated about their own axes, during raising and lowering thereof, by means of gearing 51, operable by an auxiliary motor in a manner which will be later explained.

The washing nozzles 40 are supplied with washing liquid from a supply basin 52 located within the casing 8 above the soaking basin 9, by means of a supply header 53; and the rinsing nozzles 41 and outside rinsing sprays 41' are supplied with fresh rinsing liquid derived from any suitable source, the nozzles 41 communicating directly with a smaller independent liquid supply header 54. The headers 53, 54 are mounted upon a vertically movable support 55 carried by rear and front toggles 56, 57, and these toggles

are adapted to be simultaneously straightened and subsequently simultaneously flexed so as to vertically reciprocate the support 55, by means of levers 58 secured to oscillatory shafts 59, 60 and connected by a link 61. The weight of the frame 55 and of the elements suported thereby, is counter-balanced by a weight 62 coacting with the front shaft 60, and the toggles 56, 57 are adapted to be periodically actuated by linkage 63 operable by a bell-crank 64 coacting with a cam 65 and swingably supported upon a pivot shaft 66. The cam shaft 67 is driven from the front cam shaft 47 through chain gearing 68, and as previously indicated, the cam shaft 47 is driven from the counter-shaft 37 through a chain drive 38. The washing and rinsing nozzles 40, 41 are thus actuated during periods of rest of the bottle conveyor, by the same motor 22 which normally propels the conveyor.

The improved mechanism for scrubbing the bottle exteriors and for returning the bottles 14 to the conveyor after such scrubbing, is shown in Figs. 2, 3, and 4, and comprises a row of bottle ejectors 69 operable by the motor 22, and scrubbing structure driven by another motor 70. The bottle ejectors 69 are carried by oscillatory arms 71 which are movable by a bell crank 72 mounted on the pivot shaft 66 and cooperable with another groove in the cam 65 which actuates the nozzles 40, 41, as shown in detail in Fig. 3; and the bell crank 72 is drivingly connected to the arms 71 by a connection 73 attached to one arm of a bell crank 74, the other arm of which is connected to one of the arms 71 by an adjustable link 75. The bottles 14 removed from the adjacent pockets 10 by the ejectors 69, are received by a row of reversing racks 76 which are revolvable by means of a pinion 77 coacting with a toothed rack 78, to reverse and to deliver the bottles upon sets of parallel rubber rollers 79 in advance of pushers 80, as clearly shown in Fig. 3. The rack 78 is reciprocable by a rod 81 which is connected to the bell crank 64 which also moves the washing and rinsing nozzles; and the pushers 80 are mounted upon a carriage 82 which is movable back and forth along guides 83, by a lever 84 driven from the shaft 67 by means of a crank 85 and connection 86. The several sets of rollers 79 form troughs along which the bottles 14 are longitudinally movable by the pushers 80 past a revolving brush 87, and the rollers 79 are all rotatable in the same direction so as to revolve the individual bottles about their own axes while they are being externally scrubbed. All of the rollers 79 are drivingly interconnected by a chain drive 88 extending across the machine and driven by a shaft 89 from the auxiliary motor 70 through gearing 90; and the motor 70 also drives gears 91 which is adapted to rotate the gears 51 for rotating the internal brushes 39, through a chain drive 92, as shown in Fig. 1.

The external brush 87 is swingably supported by parallel spaced arms 93 located at opposite ends of the brush and within a housing 94 having a spray 95 therein for delivering liquid to this brush, and is constantly rotatable by means of a driving chain 96 and gearing 97 associated with the shaft 89. The labels and other substances removed from the exteriors of the bottles by the brush 87, are adapted to be caught by a removable perforated pan 98 located above the basin 20, and it is to be noted that as the carrier pockets 10 are passing through this basin, the bottles are prevented from floating by a guard plate 99 and the empty pockets are both internally and externally rinsed so as to remove loosely adhering dirt. When the pushers 80 have transported the bottles 14 along the rollers 79 past the brushes 87, they are adapted to deliver the externally scrubbed bottles into the empty pockets 10 at the forward leg of the U-shaped conveyor path, and these pushers subsequently move backwards to receive other bottles.

During normal operation of the improved bottle washing machine, the driving motors 22, 70 are operating to propel the various mechanisms associated therewith, and the pawls 28 are being swung back and forth so as to intermittently advance the successive rows of carrier pockets 10, by steps equal to twice the distance between the successive rollers 12. The dirty bottles are delivered into the empty rows of pockets 10 while they are adjacent to the bar 30, and are subsequently advanced through the soaking basin 9 and upwardly along the end plate 16 after which the liquid which was picked up by the bottles in the basin 9, is returned to this basin by the inversion of the bottles 14. The preliminarily soaked bottles are subsequently removed from the carrier pockets by the ejector 69, whereupon the racks 76 are operated to reverse the bottles and to place them upon the rollers 79. The bottles are subsequently transported along these rollers by the pushers 80 and are simultaneously rotated as they are passed beneath the revolving brush 87. The bottles are thus externally scrubbed and are subsequently returned to the conveyor at the forward leg of the U-shaped path. Thereafter, the bottles are subjected to internal washing by the nozzles 40 which coact with each bottle during each travel thereof about the conveyor path. Upon reaching the zone of action of the brushes 39, the initially soaked and externally scrubbed bottles are internally scrubbed by these brushes, and are subsequently carried forward to complete the first conveyor cycle.

During the second traverse of the conveyor path, the bottles are again subjected to soaking in the basin 9, and are subsequently subjected to a further washing and rinsing action together with the intervening empty pockets 10, in the basin 20. After leaving the basin 20, the bottles are again subjected to internal washing by the nozzles 40, and thereafter, the finally washed bottles are thoroughly rinsed, both externally and internally, by the spray 41' and the rinsing nozzles 41. After final rinsing, the bottles are carried forwardly and are ultimately discharged from their carrier pockets by the ejector 31 and are delivered to the unloading racks 32. It will thus be apparent that the successive rows of bottles are caused to traverse the conveyor path twice before they are finally ejected from the machine, and during this passage through the machine, the bottles are subjected to initial soaking, to external scrubbing, to initial internal washing, to initial internal scrubbing, to final soaking in the basin 9, to further soaking in the basin 20, to final internal washing by the nozzles 40, and to final rinsing by the nozzles 41 and sprays 41'. These successive cleansing actions insure thorough scrubbing, washing and rinsing of the bottles passing through the machine, and thus insures removal of all dirt and the labels.

The labels and external deposits removed by the brush 87 cooperating with the bottles being rotated about their own axes by the roller 79, are delivered into the perforated pan 98. The excess

liquid is drained from this pan into the basin 20, and the pan 98 may be periodically removed for cleaning purposes. Undesirable pollution of the solution within the casing 8, is thereby avoided. The heating coil 15 may also be removed if desired, by opening the cover 15' at the rear end of the machine, and the other internal mechanism of the machine is readily accessible through removable covers provided at various places.

From the foregoing description it will be apparent that the invention provides highly efficient mechanism for automatically scrubbing and cleansing the bottles, both externally and internally. The improved label removing mechanism functions to bodily remove the successive bottles from one portion of the conveyor, and to deliver the same to another portion of the conveyor, thereby not only permitting thorough cleansing of the exterior of the bottles, but also permitting removal of deposits from the interior of the pockets from which the bottles have been removed. While such internal cleansing of the pockets is also effected if the pockets 10 are permitted to pass through the soaking basin 9, while they are empty, no such opportunity for cleansing of the pockets is permitted if the machine is operating at full capacity, and the provision of internal washing for the pockets 10 in the basin 20 is therefore extremely desirable. The improved mechanism has proven highly successful in actual commercial use, especially for washing beer bottles and for removing labels therefrom.

It should be understood that it is not desired to limit the invention to the exact details of construction 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 casing forming a liquid basin, a series of bottle carrier pockets, a conveyor for transporting said pockets in succession through said basin to subject the bottles being transported thereby to a soaking action and for subsequently transporting said pockets along successive oppositely directed paths, means for removing the bottles from said pockets after the latter have been withdrawn from said basin and while traversing one of said paths, means for reversing and for advancing the removed bottles along their own axes and for scrubbing the exteriors thereof during said removal from said pockets and for subsequently returning the bottles to pockets while traversing the other of said paths, and means for catching the labels and other debris removed from the bottles while the same are withdrawn from said pockets and for preventing said debris from being deposited within said basin.

2. In combination, a casing forming a liquid basin, a series of bottle carrier pockets, an endless conveyor for advancing said pockets in succession through said basin to subject the bottles being transported thereby to a soaking action and for subsequently advancing said pockets along successive downwardly and upwardly directed paths, means for removing the bottles from said pockets after the latter have been withdrawn from said basin and while traversing the downwardly directed path, means for advancing the removed bottles along their own axes and for scrubbing the exteriors thereof during said removal from said pockets and for subsequently returning the bottles to pockets while traversing the upwardly directed path, and means for effecting cleansing of the empty pockets of said series while the bottles are removed therefrom for external scrubbing.

3. In combination, a casing having a liquid basin in the lower portion thereof, a continuous series of bottle carrier pockets, a conveyor for advancing said pockets in succession through said basin to subject the bottles to a soaking action and for subsequently advancing the successive pockets within and through said casing above said basin, means for removing the bottles from said pockets and from said casing after the latter have been withdrawn from said basin, means for rotating the removed bottles about their own axes and for scrubbing the exteriors thereof during said removal from said pockets and casing and for subsequently returning the bottles to pockets of said series within said casing, and a second basin within said casing for receiving and for effecting cleansing of the empty pockets of said series while the bottles are removed therefrom for external scrubbing.

4. In combination, a casing having superimposed liquid basins therein, a continuous series of bottle carrier pockets successively movable through said basins, the lower of said basins subjecting the bottles being transported by said pockets to a soaking action and the upper basin subjecting the empty pockets to a cleansing action, means for removing the bottles from said pockets after withdrawal thereof from said lower basin and before the pockets are transported through said upper basin, means for scrubbing the removed bottles externally while removed from said pockets, and means for subsequently returning the externally scrubbed bottles to pockets of said series after withdrawal of the latter from said upper basin.

5. In combination, a casing having several liquid basins therein, a continuous series of bottle carrier pockets successively movable through said basins, one of said basins subjecting all bottles being transported by said pockets to a soaking action and another of said basins subjecting alternate empty pockets to a cleansing action, means for removing the bottles from said alternate pockets before said pockets enter said other basin, means for scrubbing the exteriors of the removed bottles, and means for returning the scrubbed bottles to said alternate pockets after removal of the latter from said other basin.

6. In combination, an intermittently movable continuous series of bottle carrier pockets, a series of independent liquid basins through which said pockets are successively movable, one of said basins subjecting all of said pockets and all of the bottles transported thereby to a soaking action and a subsequent basin of said series subjecting empty pockets of said series to a cleansing action, means for removing bottles from some of said pockets while at rest and before said pockets enter said subsequent basin, means for scrubbing the removed bottles after said removal, and means for returning the scrubbed bottles to said pockets while at rest and after the latter have been withdrawn from said subsequent basin.

7. In combination, an intermittently movable continuous series of bottle carrier pockets, a pair of superimposed independent liquid basins through which said pockets are successively movable, the lower of said basins subjecting all of said pockets and all of the bottles transported thereby to a soaking action and the upper basin of said series subjecting empty pockets of said

series to a cleansing action, means for removing bottles from some of said pockets while at rest and before said pockets enter said upper basin, means for scrubbing the removed bottles after said removal, means for returning the scrubbed bottles to said pockets while at rest and after the latter have been withdrawn from said upper basin, and means above said upper basin for catching debris removed from said bottles during scrubbing thereof and for preventing said debris from entering said basins.

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