This invention relates to a bottle-cleansing apparatus and more particularly to a machine wherein rows of bottles are subjected to the action of streams of liquid to forcibly cleanse the same.

One of the objects of this invention is to provide a simple and effective means for forcibly washing traveling bottles.

More specifically stated an object of this invention is to provide a washing device for traveling bottles wherein nozzles are directed toward the path of the bottles and shiftable to successive positions at different angles to said path so as to aim their discharge ends toward different portions of the traveling bottles.

Another object of this invention is to provide a machine for cleansing the inner and outer faces of bottles wherein streams of liquid are projected into the bottles at an inside washing zone and thereafter shifted to wash the outer faces of traveling bottles at one side of said washing zone.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts herein-after more specifically described and shown in the accompanying drawings, which illustrate one form of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications within the scope of the claims heretofore appended.

Fig. 1 is a side view of an apparatus embodying the features of this invention.

Fig. 2 is a section taken approximately on the line 2—2 in Fig. 1, the middle portion of the apparatus being broken away.

Fig. 3 is a fragmentary section taken approximately on the line 3—3 in Fig. 1, showing the details of construction at the side shown in Fig. 1.

Fig. 4 is a longitudinal section through the apparatus showing the details of the operating mechanism at a side opposite to Fig. 1, the nozzles and carriage for the same being in a lower position than that shown in Fig. 1.

Fig. 5 is a side view, partly in section, showing the nozzles and bottles in an elevated position.

To illustrate the invention I have shown rows of nozzles 6 and 7 secured to pipes 8 and 9, which extend across the machine to form pivotal supports for the nozzles. As shown in Fig. 2, the pipes 8 and 9 may continuously receive liquid from supply hoses 10 and 11 and discharge the liquid through the nozzles 6 and 7. A traveling bottle-carrier A, which moves above the nozzles 6 and 7, includes sprocket chains 12 provided with rollers 13 traveling on supports 14 at opposite sides of the machine (Fig. 2), and bottle-holders 15 arranged transversely of the machine, the bottle-holders being secured to the sprocket chains 12 by means of cross supports 16. The bottle-holders 15 are open at their upper ends to receive the bottles, and also have openings at their lower ends so that the necks of the bottles project therefrom.

The bottle-carrier A may be of a type commonly employed in bottle washing machines, wherein an intermittent motion is imparted to an endless carrier to provide intervals of rest at the bottle-washing elements. The present invention may be conveniently applied to a bottle-washing machine of this type, so as to provide for the forcible washing of the inner faces of the bottles while the carrier is at rest.

The bottle-carrier A which moves step by step advances the bottles to an inside-washing zone where the mouths of the bottles are aligned with the nozzles 6. After an interval of rest at said station the bottles are advanced to an intermediate position, between the rows of nozzles 6 and 7, and then moved to another inside-washing zone where the mouths of the bottles are aligned with the nozzles 7.

Fluid is continuously projected from the nozzles 6 and 7 and when said nozzles are in alignment with the mouths of the rows of bottles, fluid is discharged into the bottles to effectively wash the inner faces thereof.

While the bottles are at rest at said inside-washing zones, the bottles are preferably raised and lowered in the bottle-holders 15. During the raising and lowering operations, the row of bottles above the nozzles 7 may be subjected to sprays of liquid from nozzles 18 (Fig. 1) to wash the outer faces of the bottles. These nozzles 18 project fluid onto the bottoms of the bottles, and as the bottles are raised and lowered the nozzles 18 project fluid onto the side faces of the bottles.

To provide for the raising and lowering of the bottles at said inside-washing stations, the nozzles 6 and 7 are moved upwardly to raise the bottles, and then moved downwardly to lower the bottles. The nozzles 6 and 7 are preferably provided with beveled seats 19, as most clearly shown in Fig. 4, adapted to engage the mouths of the bottles, as they are raised and lowered. The beveled seats 19 will tend to hold the mouths of the bottles in alignment with the discharge
outlets of the nozzles 6 and 7 during the raising and lowering operations.

As an illustration of a suitable means for raising and lowering the nozzles 6 and 7, I have shown in Fig. 4 a reciprocating carriage B including side members 20 at opposite sides of the machine. These side members 20 are slidably mounted on guide rods 21 which are secured to and extend downwardly from stationary supports 22. The end portions of the pipes 3 and 5 which carry the nozzles 6 and 7 are pivotally mounted in bearings 23 near opposite ends of the side members 20.

The side members 20 of the carriage are pivotally connected by means of links 24 to arms 25 fixed to opposite ends of an oscillatory shaft 26. A reciprocating rod 27 driven by any suitable source of power (not shown) is connected to an arm 28 secured to the shaft 26, as shown in Figs. 1 and 5, to oscillate said shaft, thereby raising and lowering the carriage B.

The carriage B with respect to the operation of the bottle-carrier A is such that during the interval of rest of the bottle-carrier, the carriage B moves upwardly and downwardly to raise and lower the bottles. While the bottle-carrier A is in motion the bottle-carrier continues its downward movement away from the bottle-carrier and then moves upwardly, so that the nozzles 6 and 7 occupy a position approximately as shown in Fig. 1, when the bottles again come to rest. This sequence of operations is continuously repeated to raise and lower the bottles while the bottle-carrier A is at rest, and to move the carriage B away from and then toward the bottle-carrier A while the bottle-carrier is in motion.

It will be observed that the fluid projected from the nozzles 6 and 7 is discharged into the bottles to wash their inner faces while the bottle-carrier is at rest and the mouths of the bottles are in alignment with the nozzles.

During the movement of the bottle-carrier A to advance the bottles, the fluid projected from the nozzles 6 and 7 is utilized to wash the outer faces of the moving bottles. In other words, the nozzles 6 are tilted so as to aim their discharge ends toward the rows of bottles moving away from the inside washing zone at the right in Fig. 1. The nozzles 7 are also tilted to aim their discharge ends towards the outer faces of the row of bottles moving toward the inside-washing station at the left in Fig. 1.

As shown in Figs. 2 and 4, the lower portions of the bottle-holders 15 are provided with openings 29 in their sides to expose the bottles, and the tilting nozzles are aimed toward said openings while the bottle-carrier A is in motion.

The means for tilting the nozzles 6 and 7 includes a pair of arms 30. Each of the pipes 6 and 8 (Figs. 1, 2 and 4), rollers 31 rotatably mounted on the ends of the arms 30, and abutments 32 adapted to be engaged by said rollers 31 during the downward movement of the carriage B. The abutments 32 may be provided with suitable members 33 adjusably secured on said 34 depending from the supports 22.

It will be observed that as the carriage B moves downwardly, while the bottle-carrier is in motion, the rollers 31 will cooperate with the abutments 32 to tilt the nozzles to successive positions at different angles so as to aim their discharge ends towards different outside portions of the traveling bottles (Fig. 4). It will be understood that the tilting movements imparted to the nozzles may be varied by raising or lowering the abutments which are adjustably secured to the rods 34 by the clamp members 35.

As the carriage B moves downwardly from the position shown in Fig. 4, the streams of liquid from the nozzles will be projected onto bafles 36 which tend to divert part of the liquid upwardly onto the moving bottles. These bafles also tend to prevent undesirable projection of liquid across the machine.

During the upward movement of the carriage B, the nozzles 6 and 7 are returned to the position shown in Fig. 1 by means of springs 37, each of which has its ends secured to arms 38 fixed to the pipes 6 and 8 (Figs. 1 and 4). To limit the return movement of the nozzles 6 and 7, I have shown adjustable stop members 39 in the path of the arms 37 which are actuated by said springs 38. These stop members 38 are screwed into the carriage B and may be adjusted to control the return movement of the nozzles 6 and 7 so that they will be in alignment with the mouths of the bottles when the bottle-carrier is at rest.

In the operation of my cleansing device, it will be noted that the inner faces of the bottles are subjected to a succession of cycles of washing in the inside washing zones while the bottles are at rest and the mouths thereof are aligned with the nozzles. As the bottles leave the inside washing zone at the right in Fig. 1 and travel to an intermediate position, the nozzles 6 are tilted to wash the outer faces of said traveling bottles. The nozzles 7 are also tilted to wash the outer faces of the bottles traveling from said intermediate position to the inside washing zone at the left in Fig. 1.

It will be observed that the streams of liquid projected from the nozzles 6 and 7 onto the traveling bottles cooperate with each other to effectively wash the outer faces of the bottles. The nozzles 6 are tilted to discharge liquid at one side of the traveling bottles, and the nozzles 7 are tilted to subsequently wash the other sides of the bottles.

The nozzles 6 and 7 are tilted after each inside washing operation from a position such as shown in Fig. 1 to the lowest position shown by dot and dash lines in Fig. 4. This tilting operation provides for the discharge of any broken glass or other substances which may have become lodged on the nozzles 16 during the inside washing operation.

It will also be observed that the bottles passing from one inside washing zone to the other inside washing zone have an interval of rest between said zones. This interval of rest permits the bottles to drain before they are again subjected to an inside washing operation. As shown in Figs. 1 and 5, the nozzles 6 and 7 are directed away from the bottles at said intermediate drainage zone during the interval of rest.

I claim:

1. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said traveling carrier being movable step by step to carry the bottles toward and away from an inside-washing zone with intervals of rest at said inside-washing zone, a row of nozzles having discharge ends adapted to be aligned with the mouths of bottles at said inside-washing zone, said nozzles being provided with seats adapted to receive the mouths of bottles aligned with the nozzles, a reciprocating car-
riage for moving the nozzles into and out of engagement with the bottles, said row of nozzles being pivotally mounted on the carriage, and means for intermittently tilting said nozzles away from said inside washing zone while the bottles are in motion, so as to aim their discharge ends toward the outer faces of the traveling bottles at one side of said washing zone, means for restoring said nozzles to said position of alignment at said inside-washing zone, and an adjustable stop device for limiting the return movements of said nozzles so as to align the nozzles with the bottles during said intervals of rest at said inside-washing zone.

3. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said traveling carrier being movable step by step to carry the bottles toward and away from an inside-washing zone with intervals of rest at said inside-washing zone, a row of nozzles having discharge ends adapted to be aligned with the mouths of the bottles at said inside-washing zone, a reciprocating carriage for moving the nozzles into and out of bottle-supporting positions, said row of nozzles being pivotally mounted on the carrier, means for intermittently tilting said nozzles away from said inside-washing zone, and an adjustable stop device for limiting the return movements of said nozzles so as to align the nozzles with the bottles during said intervals of rest at said inside-washing zone.

4. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said traveling carrier being movable step by step to carry the bottles toward and away from an inside-washing zone with intervals of rest at said inside-washing zone, a row of nozzles having discharge ends adapted to be aligned with the mouths of the bottles at said inside-washing zone, a reciprocating carriage for moving the nozzles into and out of bottle-supporting positions, said row of nozzles being pivotally mounted on the carrier, means for intermittently tilting said nozzles away from said inside-washing zone, and an adjustable stop device for limiting the return movements of said nozzles so as to align the nozzles with the bottles during said intervals of rest at said inside-washing zone.

5. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said carrier being movable step by step to transmit the bottles from one inside-washing zone to another inside-washing zone, a row of nozzles at each inside-washing zone to project streams of liquid into the mouths of bottles aligned with the nozzles, said nozzles being provided with seats adapted to receive the mouths of bottles aligned with the nozzles, a reciprocating carriage for moving the nozzles into and out of bottle-supporting positions, said row of nozzles being pivotally mounted on the carriage, and means for intermittently tilting said nozzles away from said inside-washing zones, so as to aim their discharge ends toward the outer faces of bottles traveling between said washing zones.

6. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said carrier being movable step by step to transmit the bottles from one inside-washing zone to another inside-washing zone, a row of nozzles at each inside-washing zone to project streams of liquid into the mouths of bottles aligned with the nozzles, means for intermittently tilting said nozzles away from said inside-washing zones, spring actuated means for varying the tilting movements imparted to said nozzles, and adjustable stop members for limiting the return movements of said nozzles so as to align the nozzles with the mouths of bottles at said inside-washing zones.

7. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said carrier being movable step by step to transmit the bottles from one inside-washing zone to another inside-washing zone, a row of nozzles at each inside-washing zone to project streams of liquid into the mouths of bottles aligned with the nozzles, and adjustable stop members for limiting the return movements of said nozzles so as to align the nozzles with the mouths of bottles at said inside-washing zones.

8. In a bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders having openings to expose the outer faces of inverted bottles, said traveling carrier being movable step by step to carry the bottles toward and away from an inside-washing zone with intervals of rest at said inside-washing zone, upper rows of nozzles for projecting converging streams
of liquid onto the outer faces of the bottles at said inside-washing zone, a row of nozzles having discharge ends adapted to be aligned with the mouths of the bottles at said inside-washing zone, said nozzles being provided with seats adapted to receive the mouths of bottles aligned with the nozzles, means for raising and lowering the bottles in their holders at said inside washing zone so as to raise and lower the bottles between the streams of liquid projected from said upper nozzles, said means including a reciprocating carriage for raising and lowering the nozzles, said row of nozzles being pivotally mounted on the carriage, and means for intermittently tilting said nozzles away from said inside washing zone while the bottles are in motion, so as to aim their discharge ends toward the outer faces of traveling bottles at one side of said washing zone.

9. A bottle-cleansing machine provided with a traveling carrier including rows of bottle-holders for inverted bottles, said carrier being movable step by step to transmit the bottles from one inside-washing zone to another inside-washing zone with an interval of rest at an intermediate drainage zone between said inside-washing zones, a row of nozzles at each inside-washing zone to project streams of liquid into the mouths of bottles aligned with the nozzles, and means for tilting said nozzles toward and away from said intermediate drainage zone, said nozzles being directed away from the bottles at said intermediate drainage zone during said interval of rest.

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