

July 10, 1962

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3,043,318

MACHINES FOR WASHING BOTTLES AND LIKE CONTAINERS

Filed Jan. 25, 1960

Fig. 1

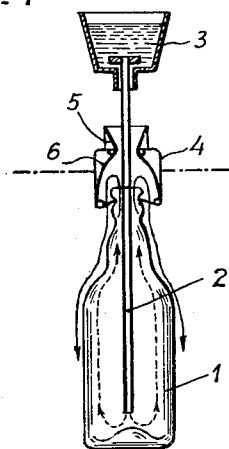


Fig. 2

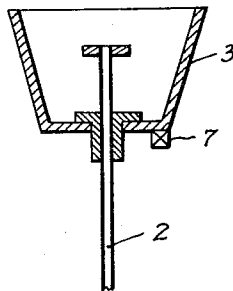


Fig. 3

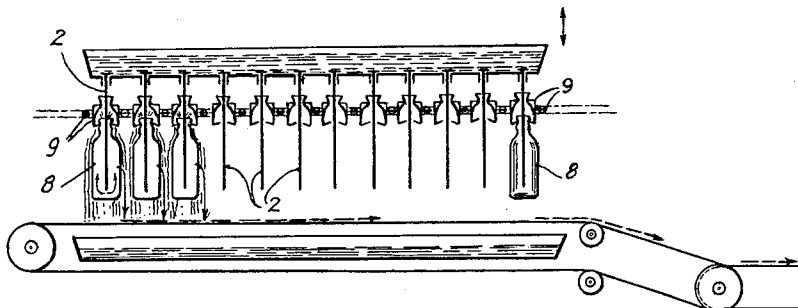
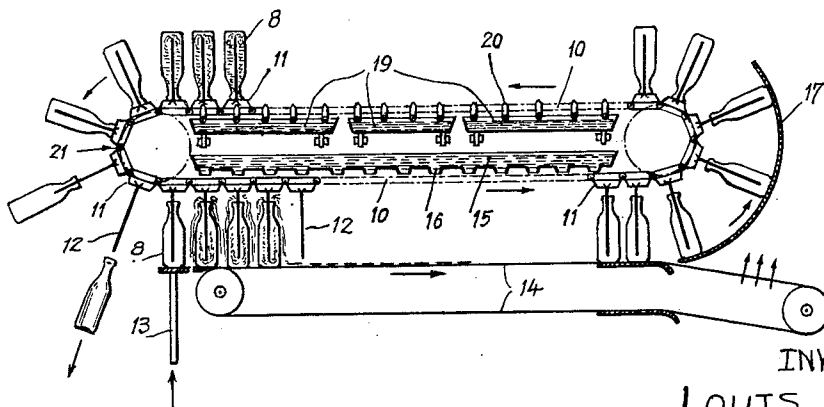


Fig. 4



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Filed Jan. 25, 1960, Ser. No. 4,246

Claims priority, application France Feb. 2, 1959

7 Claims. (Cl. 134—104)

In general, bottle washing machines combine or not the chemical action of an active solution (for example a detergent solution with a mechanical or dynamic action such as a brushing, this treatment being completed by a rinsing step and a draining step.

In most cases the solution operates by immersion and or high-pressure injection, these modes of operation being applied successively or alternately.

The factors influencing the washing speed, such as temperature, treatment time, concentration of the active solution, are well known.

However, an important factor was partially disregarded up to now since it is used systematically only during internal and external pressure injections. This factor is the relative speed of the active solution and of the wall to be cleaned. Thus, during the immersion constituting the most important part of the treatment, the active solution is practically stationary both inside and outside the bottle or container.

Moreover, the immersion treatment entails the use of considerable volumes of active solution of which only a very small fraction is really useful, and during the successive cleanings of the machine a large quantity of this solution is definitely lost.

Finally, the conventional treatment by immersion and injection removes the labels from the bottles which are thus mixed with the active solution under such conditions that it is difficult if not impossible to separate them from these solutions. As a result, many inconveniences are observed, such as the pollution of the cleaning baths by the glue, the cellulose, the dyestuffs, etc.

It is the object of the present invention to provide a bottle washing machine wherein the washing reactions are accelerated by creating a velocity of passage between the active solution and the inner and outer walls of the bottle through the use of a spray nozzle. This nozzle may be used if desired for filling the bottle with liquid, whereafter it is kept operating for washing the bottle during a predetermined time period in order efficiently and quickly to wash the bottle by accelerating the reactions, thus avoiding the use of large quantities of liquid. This combined action may be termed as a "dynamic immersion."

The nozzle is fed with active solution either through lines under pressure or from a trough or vat open at the top.

The labels are removed by allowing the active solution to overflow from the upper portion of the bottles and stream along their walls.

If necessary, the streaming may be distributed regularly along the walls of the bottle by providing a bell-shaped member adapted to direct the liquid jets with a sufficient homogeneity thereagainst.

The labels fall onto a conveyor belt and are thus led to the outside in order to avoid the bath pollution and the label deterioration while permitting the easy and quick removal of the labels. The bottles are either suspended by their necks by means of a clamp in the case of bottles of a type other than those provided with a knee-action stopper, or carried by the label-receiving conveyor belt in the case of bottles having a knee-action stopper.

The action exerted by the injection nozzles may be

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completed by other injections applied externally of the bottle in order to complete the liquid streaming effect produced by these nozzles.

A machine of this character for washing bottles and like containers is also advantageous in that it permits of dispensing with the crates usually employed for washing bottles, so that the relative spacing of the bottles may be reduced accordingly. This reduction, plus the acceleration of the washing time, affords a substantial reduction in the length of the machine.

The nozzles, during its operation, may be either fixed and caused to move alternately in and out from the bottles as these are presented thereto, or adapted to follow the bottles during part or the whole of their travel through the machine.

The nozzle may also be used for complementary operations, for example for injecting air and/or steam, effecting a vacuum suction, etc. and this nozzle may also be replaced by a rotary brush at certain stations of the machine.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction herein-after described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawing in which:

FIGURE 1 is a diagrammatic sectional view showing a bottle with the corresponding washing nozzle during the washing operation;

FIGURE 2 is an axial section showing on a larger scale a typical form of embodiment of a nozzle mounted through the bottom of an open-top trough;

FIGURE 3 is a diagrammatic fragmentary view showing a series of bottles suspended from a chain of clamps driving the bottles intermittently beneath the nozzle-carrying trough or troughs, and

FIGURE 4 illustrates diagrammatically a typical form of embodiment of a bottle washing machine constructed in accordance with the teachings of this invention in the case of bottles provided with a knee-action stopper.

Referring to the drawing and more particularly to FIGS. 1 and 2, the bottle 1 to be cleaned is shown as receiving therein a nozzle 2 solid with the bottom of a trough 3; this bottle 1 is supported by a metal clamp 4 fitting on the bottle neck; overlying this neck is a member, one portion 5 of which constitutes a guide funnel for introducing the nozzle, the other portion 6 constituting a deflection bell for regularly distributing over the entire outer wall of the bottle the chemical solution overflowing from this bottle. In the case of bottles closed by means other than knee-action stoppers, these bottles are suspended by their neck from a conveyor chain by means of the aforesaid clamps 4 and their bottom is removed from the walls of the machine and in practice from a travelling band or belt the function of which will be set forth hereafter.

The washing solution issuing from the bottle is allowed to stream along the outer wall, for the dual purpose of washing this wall and, at the same time, removing the labels therefrom, the latter falling without being torn or otherwise damaged onto the underlying travelling band or belt cited in the preceding paragraph, which leads these labels to the outside.

To illustrate a typical form of embodiment of reciprocating nozzle, there is shown on a larger scale in FIG. 2 a nozzle 2 and the trough 3 associated therewith. This nozzle may for example be slidably mounted through the bottom wall of the trough and the vertical position of

this trough may be defined by adjustable stops 7 to take due account of the different capacities and heights of the bottles to be cleaned.

In this case, when the machine receives bottles of reduced height the stops are raised to prevent the nozzle from striking the bottom of the bottles. However, when the machine contains at the same time two types of bottles the nozzle may strike the bottom of the small bottles without damaging it since the nozzle can rise in its trough. Moreover, the lower edge of the nozzle may be bevelled or notched to permit the spraying of liquid all around the interior of the bottle even when the nozzle engages this bottom wall.

FIG. 3 shows diagrammatically a series of bottles 8 suspended from a device 9 consisting of clamps secured at spaced intervals on a conveyor chain and driven therefrom intermittently beneath the nozzle-carrying trough or troughs. Each bottle is stopped during a predetermined time period under a trough and during this period the nozzle is lowered inside the bottle and then extracted therefrom.

FIG. 4 shows a modified form of embodiment of the machine which is designed more particularly for washing bottles having knee-action stoppers which are therefore more difficult to hold by their neck. In this case, the bottles to be cleaned are placed on a conveyor band.

The installation comprises an endless conveyor chain 10 the links of which consist of separate troughs 11 each carrying a nozzle 12 in their bottom. A mechanism 13 of any suitable and known description is adapted, after preliminary emptying, rinsing and heating steps, if required, to bring each bottle to a position in which the nozzle 12 penetrates through the neck of the bottle, whereafter the latter is carried along, by the conveyor band 14 supporting same, at the same linear speed as the speed of chain 10. A duct 15 located between the chain reaches receives the soda solution and pours it through ports 16 into the link-forming troughs 11 of the chain. This solution flows through the nozzles 12 into the bottles and washes the interior thereof. The solution overflowing from the bottles streams along their outer wall to wash same while removing the labels which fall onto the conveyor band 14 consisting for example of wire gauze. At the outlet end of the conveyor band 14 these labels are removed by blowing, brushing or any other adequate method.

Upon completion of the washing phase the bottles are still carried along by the endless chain at the outlet end of the conveyor band and guided along the curved portion of their travel by a slideway 17, as shown.

On the upper reach of the chain 10 the bottles, still engaged by their nozzles 12, travel upside-down and receive from the cradles 19 carrying the nozzles 20 the liquid and the suitable solutions under pressure for the inner and outer rinsing of the bottles. Subsequent to this rinsing step, the bottles engage the other curved portion 21 of the chain and leave the nozzles, the washing operations being completed.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention, as those skilled in the art will readily understand. Such modifications and variations are considered to be within the province and scope of the invention and appended claims.

I claim:

1. In a bottle washing machine, a bottle conveyor, means for directing a stream of liquid down the exterior wall of the bottle to forcibly remove a label from the bottle without damaging the label, and an endless belt conveyor underlying the path of the bottles carried by said bottle conveyor for receiving the label and removing the label and further prevent damage thereto, said means for directing a stream of liquid including a bottle clamp carried by said bottle conveyor, an upper nozzle guide carried by said bottle clamp, a lower deflector bell for deflecting liquid flowing out of a bottle down the exterior wall thereof, and a nozzle connected to a liquid supply and projecting through said bottle clamp for directing the liquid into the interior of the bottle to also wash the interior of the bottle.

2. The apparatus of claim 1 wherein said nozzle is disposed at a fixed location along the path of said bottle conveyor, and means are provided for reciprocating said nozzle through said bottle clamp.

3. The apparatus of claim 1 wherein there are a plurality of said bottle clamps and a plurality of said nozzles, said nozzles are disposed at fixed locations along the path of movement of bottles, and means are provided for reciprocating each nozzle separately each time a bottle is presented to the location of the corresponding nozzle.

4. In a bottle washing machine, a bottle conveyor, means for directing a stream of liquid down the exterior wall of the bottle to forcibly remove a label from the bottle without damaging the label, and an endless belt conveyor underlying the path of the bottles carried by said bottle conveyor for receiving the label and removing the label and further prevent damage thereto, said means for directing a stream of liquid including a nozzle for directing the liquid into the interior of the bottle for first washing the interior of the bottle prior to the removal of the label, said bottle conveyor being formed of a plurality of link forming troughs each carrying a nozzle, and means for directing liquid into said troughs.

5. The apparatus of claim 4 wherein said endless belt conveyor supports bottles during the washing and label removing operation.

6. The apparatus of claim 4 wherein said endless belt conveyor supports bottles during the washing and label removing operation, said bottle conveyor having upper and lower runs with curved transition portions, said nozzles carrying bottles through said transition portions, and a curved guide along one of said transition portions for retaining bottles on said nozzles.

7. In a bottle washing and label removing apparatus, a bottle clamp for engaging necks of bottles, an upper nozzle guide carried by said bottle clamp for directing a nozzle into a bottle carried by said bottle clamp, and a lower deflector bell for directing a washing liquid overflowing out of a bottle down the exterior wall thereof to remove a label thereon.

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