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Rosen Jacobson, Frans Lucas M. et al**Unilever N.V.,****Patent Division,****P.O. Box 137****3130 AC Vlaardingen (NL)**(54) **Process and device for the mechanical cleaning of beverage packings for recurrent usage**

(57) A process and a device for the mechanical cleaning of beverage packings for recurrent usage made of glass or plastic is described, which consists of one or more washing cycles or zones and rinsing cycles or zones in a cleaning installation. The beverage packings for recurrent usage are subjected to a pre-treatment, before being conveyed to the actual cleaning installation. The beverage packings for recurrent usage are being sprayed via one or more spray nozzles (9, 10, 11) with an air-cleaning composition mixture in the form of a spraying mist, which enters through the opening into the inside of the beverage packings for recurrent usage to be cleaned, where the spraying mist is spreading out evenly. The pre-treatment makes certain that also tenacious contamination or a micro-organism like fungus or yeast is effectively removed in the cleaning installation.

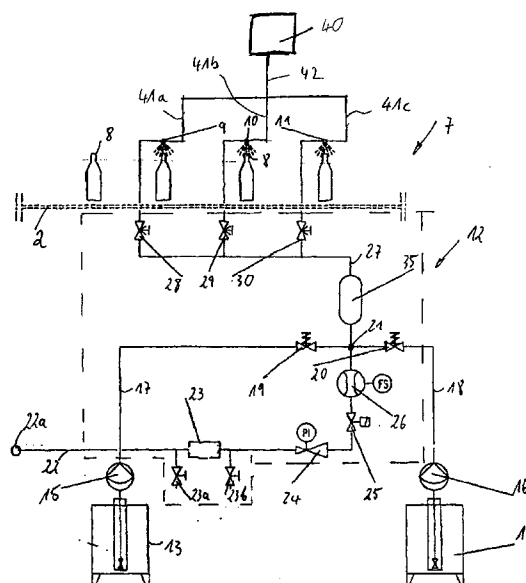


Fig. 1

Description

Field of the invention

The invention relates to a process and a device for the mechanical cleaning of beverage packings for recurrent usage made of glass or plastic, in particular bottles made of PET, PEN or PC.

Background of the invention

The known beverage packings, in particular bottles made of glass or plastic, are subjected to an intensive cleaning before being re-used, which should comply with the rigid legal regulations and directives for the food industry. In automatic installations the cleaning and filling of the beverage containers generally takes place in a closed system. The known installations generally include a conveying device for the cases with the bottles, a device to take out the bottles and to unscrew the caps, a device to detect remainders in the bottles which are harmful to the health, which are also referred to as sniffers, a machine to clean the bottles, a filling device, a device to screw on the caps, a device to pack the bottles into the cases and a device for the conveyance of the cases with bottles.

In the known standard cleaning devices, the cleaning of the beverage packings for recurrent usage only takes place inside the cleaning installation, which usually contains up to three caustic baths. The concentration of NaOH in these baths is between 1.0 and 3.0 wt. %, whereby between 0.05 and 1.0 wt. % of additive is added to the caustic solution for the hardness stabilisation and support of the cleaning action. Such standard cleaning processes are indeed generally used in standard cleaning processes are indeed generally used in practice, however the risk exists, in particular when cleaning plastic packings for recurrent usage made of PET, PEN and PC, that not only difficult removable contamination but also a micro-organism like fungus or yeast cannot or is only partly removed in the cleaning installation.

A process for the mechanical cleaning of beverage packings for recurrent usage made of glass or plastic is described in the German application P 196 44 742.9. In this process an aqueous cleaning composition is sprayed via one or more spray nozzles into the beverage packings for recurrent usage. The aqueous cleaning composition thereby is squirted into the bottle and only behind the neck of the bottle the jet of cleaning liquid will turn partly into a misty spray, which thereafter will wet the cylindrical inside wall of the bottle. When applying a jet of cleaning liquid it has turned out that critical parts on the inside of the bottle to be cleaned are not cleaned or are cleaned insufficiently. In particular the transitional area between the neck of the bottle and the cylindrical wall is not reached in the case of big-bellied bottles. Another critical area is the opening of the bottle,

because the jet of cleaning liquid is shaped conically and will only strike the inside wall of the bottle below the opening of the bottle.

5 Definition of the invention

It is an objective of the invention to develop the process according to P 196 44 742.9 further in such a manner that the total surface-area of the inside wall of the bottle to be cleaned will be wetted.

This task is accomplished by applying a process according to claim 1 wherein an air-cleaning composition mixture is sprayed in the form of a spraying mist through the opening into the inside of the beverage packings for recurrent usage. Because a spraying mist leaves the spray nozzle, the area of the opening of the bottle to be cleaned is also caught and wetted with the cleaning composition. The spraying mist enters the inside of the bottle to be cleaned and especially also wets the transitional areas between the neck of the bottle and the cylindrical part of the wall. It has been shown that also in the case of very big-bellied bottles the corresponding areas are being wetted very well. A spraying mist has the advantage that its velocity in the direction of the bottom of the bottle is not so large as is the case with a squirt of liquid, so that the mist droplets are also moving at right angles to this direction of preference and can get to areas of the wall of the bottle which normally are inaccessible.

The invention also provides a device suitable for carrying out the process of the invention and having the characteristics mentioned in claim 5.

Detailed description of the invention

Preferably the aqueous cleaning composition and the air for obtaining the mixture according to the invention are brought together in the spray nozzle.

It is advantageous to use pressurised air in order that the pressure can be adjusted to the type and amount of the aqueous cleaning composition for generating the desired spraying mist.

In order yet to reach the complete opening of the bottle with spraying mist preferably a cone-shaped spraying mist is created.

The bottles are preferably pre-treated during the conveyance to the cleaning installation. The cleaning composition is sprayed at the known filling lines in the beverage industry behind the unscrewers as viewed in the direction of conveyance, if present, behind the sniffer.

Preferably the contact time of the cleaning composition is between 0.5 and 30 minutes. During the contact time the beverage packing for recurrent usage is not sprayed intentionally. The packings can also be pre-stored before entering the cleaning installation in the case of particularly tenacious contamination and being subjected to a pre-treatment there in order to achieve

contact times of up to several weeks. However, it is preferred to include the pre-treatment in the known filling line, whereby generally a sufficiently long contact time can be obtained without a reduction of the conveyance speed.

In a preferred embodiment, the beverage packings for recurrent usage are conveyed during the pre-treatment in single rows and sprayed with the aqueous cleaning composition by use of a multiple number of spray nozzles, whereby the volume of the liquid produced by each spray nozzle is between 1 and 20 l/h depending on the tenacity and type of contamination.

The aqueous cleaning composition for use in the process according to the invention preferably contains at least 0.5% by weight of one or more active cleanign agents. This cleaning composition is generally highly concentrated and is preferably mixed, directly before discharge, with water, the concentration of the composition in the use solution being generally in the range of 0.1-100% by weight, preferably 0.5 - 3% wt.

A product suitable for effective removal of contamination on the internal surface of the treated bottles, can be formulated as follows:

	% wt
Inorganic acid	30 - 50
Wetting agent	18 - 28
Dispersing polymer	2 - 7
Threshold agent	2 - 7
Chelating agent	5 - 10
Water to 100% wt	

The device suitable for carrying out the process of the invention is characterised in that at least one of the spray nozzles which are placed over the opening of the bottles to be cleaned, is shaped for the production of a spraying mist. Preferably this concerns a spray nozzle in which liquid and gas can be brought together, in order that a spraying mist can be produced. Therefore, the device is provided with a compressed air device which is connected with the spray nozzle. Further, a mixing device for preparation of an aqueous cleaning composition is provided, which is also connected with the spray nozzle. The mixing device is provided with containers for the cleaning composition as well as for additives.

Preferably the compressed air device is shaped such that it can be adjusted, in order that the spraying mist can be adjusted to various conditions, like e.g. type and amount of the cleaning composition.

The invention is now illustrated by way of the following drawings in which:

Fig. 1 is a preferred form of the execution of the pre-treatment installation and

Fig. 2 is a schematic drawing showing the way of spraying by the spray nozzle.

Fig. 1 shows a preferred form of the execution of a pre-treatment installation 7. The installation includes spray nozzles 9, 10, 11 which are arranged in rows over the belt-conveyor 2 directly above the bottle openings 8, a mixing device 12 and a container 13 which contains the cleaning composition as well as a container 14 which contains caustic, acid or a stabilisator solution for the cleaning agent. The highly concentrated cleaning composition and the caustic, acid or the stabilisator solution are led to a mixing point 21 by means of membrane pumps 15, 16 via supply pipes in which dose measuring valves 19, 20 are fitted. A water supply pipe 22, which is connected with a water supply 22a, is also connected with the mixing point 21. A pipe line separator 23 with a draining tap 23a before this separator and a draining tap 23b behind this separator is fitted in the water supply pipe 22 for rinsing purposes. A pressure reducer 24, a magnet valve 25 for the automatic closing of the water supply, for example during a stop of the belt-conveyor 2, and a flow-through gauge 26 follow behind the pipe line separator 23. The mixing point 21 is connected with the spray nozzles 9, 10, 11 via a branching-off supply line 27, in which an air pressure vessel 35 is mounted, whereby needle valves 28, 29 30 for adjusting the volume of liquid produced by the spray nozzles in dependence on the tenacity or kind of the contaminants are mounted in the separate pipe line branches.

In addition, the spray nozzles 9, 10, 11 are also connected with compressed air pipe lines 41a, b, c, which are connected via a common compressed air pipe line 42 with a compressed air device 40. Air and cleaning composition are being brought together in the spray nozzles 9, 10, 11, so that a fine spraying mist leaves the nozzles, which already wets the top area of the neck of the bottle and which widens to cover the total inside space of the bottle to be cleaned.

Pressure and air mixture are adjusted to the type and amount of the required cleaning liquid, so that the desired spray mist can always be achieved.

Fig. 2 shows the spraying picture of the spray nozzles 9, 10, 11, which are placed closely above the bottle openings 8, which are connected with the supply pipe line 27. The spray nozzles are shaped such that a conical spraying mist 43 is achieved, which is adjusted such that it already wets the inside of the bottle in the area of the opening 8. The transitional area 35 between the neck 32 of the bottle and the cylindrical inside wall 34, which generally is only reached by a spraying jet with difficulty, is also wetted by the spraying mist 44, which covers the complete inside area space up to the bottom of the bottle. While the bottles move on a belt conveyor into the direction of the cleaning installation, the misty cleaning composition dissolves the clinging contamination, which thereafter is removed in the cleaning installation together with the cleaning composition.

Claims

1. Process for the mechanical cleaning of beverage packings for recurrent usage made of glass or plastic, which comprises one or more washing cycles or zones and rinsing cycles or zones in a cleaning installation, whereby an aqueous cleaning composition is sprayed in a pre-treatment installation via one or more spray nozzles into the beverage packings for recurrent usage and the contamination as well as the micro-organism is removed only thereafter in the cleaning installation, **characterised in that** the cleaning composition is mixed with air and the resulting mixture is sprayed in the form of a spraying mist through the opening into the inside of the beverage packings for recurrent usage.

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2. Process according to claim 1, **characterised in that** the aqueous cleaning composition and the air are brought together in the spray nozzle.

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3. Process according to claim 2, **characterised in that** compressed air is used, which pressure is adjusted to the type and amount of the aqueous cleaning composition for achieving a spraying mist.

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4. Process according to any one of the claims 1 to 3, **characterised in that** a cone-shaped spraying mist is created.

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5. Device for cleaning of beverage packings for recurrent usage made of glass or plastic, **characterised in that**
 - at least one of the spray nozzles (9, 10, 11) which are placed over the opening of the bottles to be cleaned, is shaped for the production of a spraying mist,

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 - a compressed air device (40) is connected with at least one of the spray nozzles (9, 10, 11) and

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 - a mixing device (12) including containers (13, 14) respectively containing the cleaning composition and additives for the preparation of an aqueous cleaning composition, is also connected with the spray nozzles (9, 10, 11).

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6. Device according to claim 5, **characterised in that** the compressed air device (40) is adjustable.

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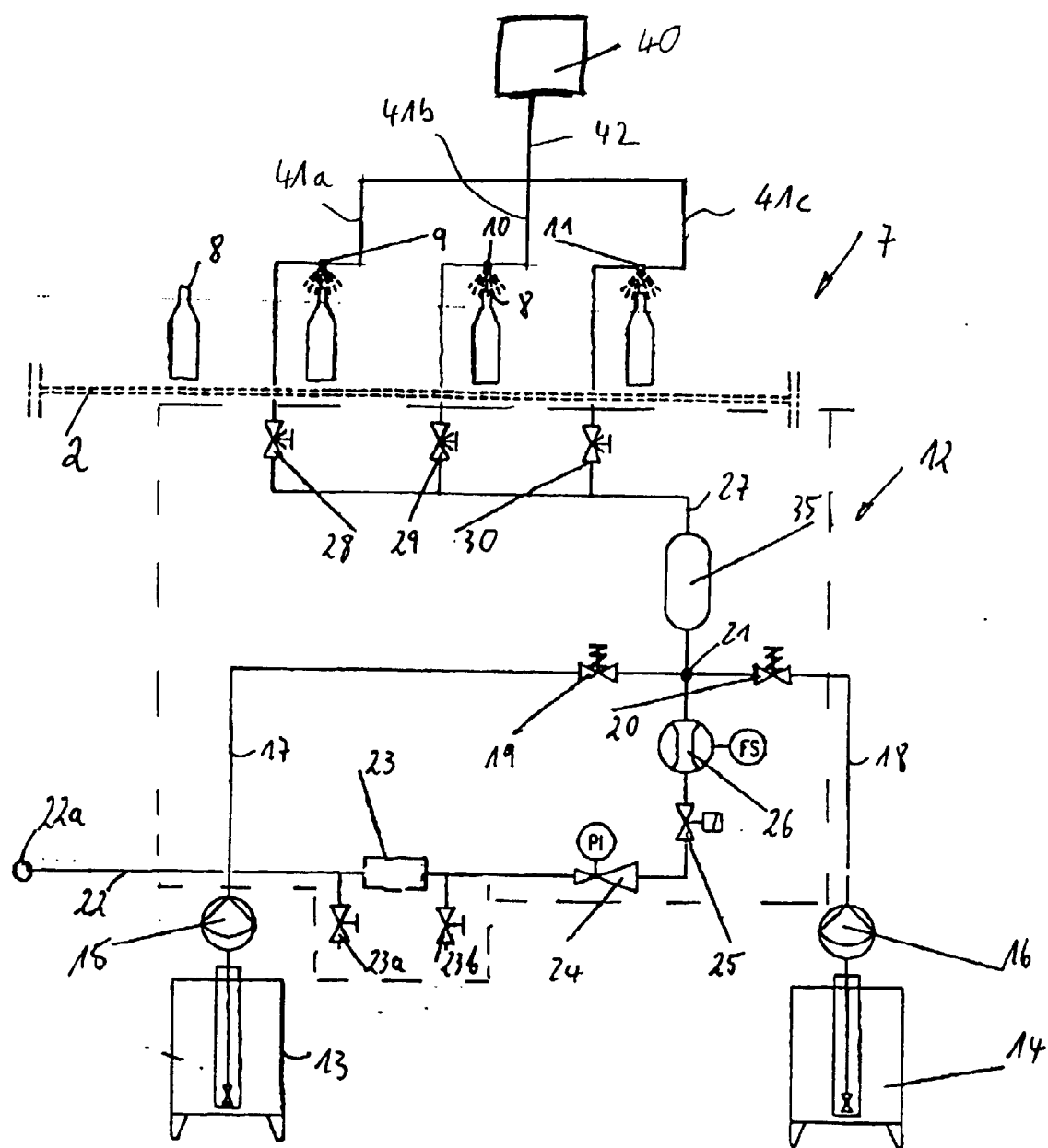


Fig. 1

