

IMPROVED METHOD AND APPARATUS FOR WASHING ARTICLES

Field of the Invention

5 The invention relates to a process and apparatus for washing articles such as dishes, cutlery, etc. In particular, the invention relates to an automated and continuous washing process.

Background

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The washing of high volumes of consumer items, particularly those that require regular washing, for example dishes and cutlery from food centres and airline catering, are conventionally washed by hand involving a highly labour intensive batch or continuous process. Such processes typically involve inefficient use of water with water
15 consumption relatively high and on a per article basis extremely high. Despite this excessive water consumption, the inefficient water use may also lead to cross contamination, where food particles of a previous batch are insufficiently disposed of prior to the cleaning of the batch. It follows this represents a significant health risk.

20 More recently, automated processes have been adopted so as to solve the labour intensive aspect. In such systems, the articles are loaded into crates or baskets and passed through various stations via a conveyor belt, so as to systematically undergo rinsing, detergent washing and drying. Such an approach is also less water intensive with water management more controllable than the former manual method.

Nevertheless, cross contamination is still an issue as the conveyors and reusable baskets or crates may still carry food particles, or other such material, and so affect the cleanliness of subsequent batches.

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Summary of Invention

In a first aspect the invention provides a device for washing articles comprising: a pre-wash section for the removal of particles from said articles; a wash section for the
10 removal of residue from said articles; a pre-wash conveyor for conveying said articles in the pre-wash section, and; a wash conveyor for conveying articles in the wash section; where said pre-wash and wash conveyors are separate with said pre-wash conveyor terminating at the commencement of the wash conveyor, said articles transferred from the pre-wash conveyor to the wash conveyor.

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In a second aspect the invention provides a method for washing articles, the method comprising the steps of: conveying said articles through a pre-wash section on a pre-wash conveyor; removing particles from said articles; transferring said articles from the pre-wash conveyor to a wash conveyor; conveying said articles through a wash section
20 and; removing residue from said articles.

Accordingly, by including a pre-wash process prior to the washing process, and further, by providing a physical separation between the carriers of the pre-wash and carriers of the washing process, the source of cross-contamination is eliminated.

Brief Description of Drawings

It will be convenient to further describe the present invention with respect to the
5 accompanying drawings that illustrate possible arrangements of the invention. Other
arrangements of the invention are possible and consequently, the particularity of the
accompanying drawings is not to be understood as superseding the generality of the
preceding description of the invention.

10 Figure 1 is a flow chart showing a process according to one embodiment of the present
invention;

Figures 2A and 2B are various views of a system for the washing of articles according
to a further embodiment of the present invention;

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Figure 3 is a schematic view of a system for the washing of articles according to a
further embodiment of the present invention;

Detailed Description

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Figure 1 shows a flow chart for a process 5 for the cleaning of articles. The process
commences with a soaking section 10 so as to soften waste material, such as food scraps,
which may be encrusted on the articles which for the purposes of this description shall
be referred to as dishes.

The soaked dishes are then delivered to a high pressure spray section 15 whereby the softened material is removed from the dishes. The dishes are then passed to an ultrasonic cleaning section 20 whereby they are passed through an ultrasonic bath so as to remove any final material which may have become embedded and not removed in the previous sections. At this stage, there is a high degree of confidence that the articles/dishes are not free from waste material. Because the pre-cleaning apparatus is not directed to the article carrier or conveyor, that degree of confidence does not apply.

10 The soaking, high pressure spray and ultrasonic cleaning sections represent the pre-wash phase. The dishes are then removed from the pre-wash carriers and placed in carriers for the pre-cleaning section 25.

The cleaning section 25 may be a cleaning device according to the prior art. In this case, whilst the cleaning device may be designed to remove food particles from the dishes, in fact, all food particles have now been removed with only residue, such as grease, oil and fats, remaining to be removed.

Alternatively, the cleaning section 25 may be a dedicated cleaning device arranged for the specific removal of residue such as grease, oil and fats on the basis that all food particles have already been removed.

Figures 2A and 2B show a washing device for continuous automated washing of dishes and cutlery. The device 30 has a soaking section 35, a high pressure spray section 40,

an ultrasonic washing section 45, a loading section 55 for loading dishes from the pre-wash phase 35, 40, 45 into the washing phase 60. The dishes are then unloaded 120 at the end of the device.

5 In particular, the soaking section 35 includes two conveyors 70, 75 arranged to convey baskets or crates 80 of dirty dishes to which are exposed a soaking spray. The residence time in the soaking section 35 for the dishes exposed to the soaking spray is sufficient for the soaking of encrusted food particles on the dishes. Whilst it is not expected that a high proportion of the food particles will be removed in this section, it is intended that
10 the adhesion of the food particles to the plates is sufficiently reduced for downstream sections.

The high pressure section spray 40 then either receives the crates of soaked dishes, or unloads the dishes from the crates for direct application of a high pressure spray in order
15 to remove the soaked food particles from the dishes. It should be noted that the soaking section 35 may also act as a buffer for containing a quantity of dishes so as to avoid a bottle neck in the high pressure spray section 40. To this end, the residence time in the soaking section may be further enhanced by increasing the soaking for more efficient removal of food particles.

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As a final pre-wash stage, the dishes are then passed through one or more ultrasonic baths 85, so as to be immersed in the ultrasonic bath. The bath, or baths, includes ultrasonic transducers therein so as to apply ultrasonic waves to said articles as a final quality check that all food particles have been removed.

The dishes are then loaded onto a wash conveyor 90 from the ultrasonic conveyor 50. In the present embodiment each of the sections 35, 40, 45 have separate conveyors so that any food particles locked onto the conveyor are not then transferred to the downstream sections. The conveyor 50 from the ultrasonic bath does not transfer the pre-wash carriers such as baskets (not shown) to the washing stage 60. Thus, the second source of cross-contamination found in the prior art is removed. It will be appreciated that the pre-wash section and wash section are physically separated through the transfer of dishes from one conveyor 50 to the wash conveyor 90. Thus, whilst in this embodiment each pre-wash section has a distinct conveyor system, it is sufficient within the present invention that the conveyor of the pre-wash section is distinct from the conveyor of the wash section.

In the wash section 60, the washing device may be similar to that of the prior art in that the original design may be adapted for the complete washing of plates including the removal of food particles. However, when coupled with the pre-wash section according to the present invention, such a design is unnecessary as dishes reaching the wash section 60 will already have food particles removed.

Alternatively, the invention may include a wash section which is specifically adapted for the removal of grease, oil and fat from the dishes and so more efficiently designed given that food particles are assured to have been removed in the upstream portions of the device.

In the present embodiment, the cleaning section moves the dishes from the loading conveyor 90 to a spray rinse 95 followed by a final rinse 100 prior to a sterilizing spray 105. This series of rinse stations may be useful to ensure that any moisture lost during the transfer from the pre-wash section to the wash section is replaced during the rinse.

5 The rinse stations are designed to ensure the removal of grease, oil and fat from the dishes so as to provide a continuous flow of clean dishes to the blow-dry stations 110, 115 prior to the unloading section 65 to be unloaded from the conveyor 120.

Figure 3 is a schematic view of a washing device according to another embodiment of
10 the present invention. As with the previous embodiment, the device 122 has a soaking section 125, a high pressure spray section 130 and ultrasonic washing section 135 and a washing section 140.

The schematic indicates the various supply lines including cold water 170 and hot water
15 160, including a drain line 155 with all 3 being common to the entire device 122.

The soaking section shows the array of soaking sprays 145 for delivering a soaking spray 150 to a plurality of baskets 150 located upon conveyors 175. As mentioned previously, the length and speed of conveyor 175 will be a function of both the required
20 residence time in order to sufficiently soak encrusted particles on the articles and to act as a buffer for receiving a continuous supply of articles so as to avoid bottlenecks at any of the sections downstream.

The high pressure spray section 130 indicates the high pressure spray 180 directing the spray onto articles on dedicated conveyors 185. The spray water and removed food particles from the dishes are then collected 190 and directed to a sump 195 for draining and waste disposal.

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The dishes are then directed to another dedicated conveyor 205 within the ultrasonic section 135. The dishes undergo a final pre-wash stage through an ultrasonic bath 200 for the final removal of any residual food particles. The dishes are then delivered to a loading conveyor 210 for loading to the washing section 140. Whilst the embodiments
10 of Figure 2A, 2B and 3 show a transfer of conveyor from the ultrasonic section to the loading section for the washing stage, it may be economic in order to have this transfer stage to be manually arranged. In this way, the operator can decide upon the type of decision process for delivering dishes and cutlery to the specific carriers for the wash section. This would permit a wide variety of dishes and cutlery to be managed by the
15 device 122. Alternatively, a sorting system may be incorporated whereby a finite range of dish types may be automatically sorted and stacked within carriers for the washing section. Further still, each item passing through the device may include an identification tag such as an RFID detect, bar code or other means of automatic identification such that a sorting system identifies the item and sorts it according to the
20 information on the identification tag. To this end, the system may include at least one, and perhaps several, interrogation stations for interrogating the identification tags and storing said information on a database for future use.

The advantage of identification tags such as an RFID or bar code also allows information on the owner of dishes for eventual repackaging as well as the number of times the dish has been cleaned for plate longevity assessment. Thus, such an identification tag may be very useful for the tracking and other information that could
5 be provided for the purposes of receiving and delivering dishes from clients as well as for charging based on a per article basis.

As with the previous embodiments the dishes passed from the loading conveyor 210 into the washing stage 140 to undergo a spray rinse 215, a final rinse 220 and
10 sterilization spray 225. For the purposes of removing grease, oil and fat from the dishes and cutlery, any one of the spray rinse 215, final rinse 220 and sterilization rinse 225 may include a detergent aspect so as to ensure dissolving of the residue on the plates prior to the blow dry phase 230, 235 and finally unloading 240 from the end of the conveyor 245.

Claims

1. A device for washing articles comprising:
 - a pre-wash section for the removal of particles from said articles;
 - 5 a wash section for the removal of residue from said articles;
 - a pre-wash conveyor for conveying said articles in the pre-wash section, and;
 - a wash conveyor for conveying articles in the wash section;
 - wherein said pre-wash and wash conveyors are separate with said pre-wash conveyor terminating at the commencement of the wash conveyor, said articles
 - 10 transferred from the pre-wash conveyor to the wash conveyor.
2. The device according to claim 1, wherein the pre-wash section comprises a soaking section, a high pressure spray section and an ultrasonic section for having baths with ultrasonic transducer therein and arranged to receive said
- 15 articles.
3. The device according to claim 1 or 2, wherein each of the soaking section, high pressure spray section and ultrasonic sections have separate conveyors.
- 20 4. The device according to any one of claims 1 to 3, further including at least one interrogation section for interrogating identification tags on said articles.
5. The device according to any one of claims 1 to 4, wherein the conveyors are arranged to convey the articles whilst said articles are in crates.

6. The device according to any one of claims 1 to 5, further including an article
sorter located intermediate the pre-wash conveyor and the wash conveyor, said
article sorter arranged to receive said articles from the pre-wash conveyor and
5 sort said articles by category into baskets for said wash conveyor.
7. A method for washing articles, the method comprising the steps of:
conveying said articles through a pre-wash section on a pre-wash conveyor;
removing particles from said articles;
10 transferring said articles from the pre-wash conveyor to a wash conveyor;
conveying said articles through a wash section and;
removing residue from said articles.
8. The method according to claim 7, wherein the removing particles step includes
15 the steps of:
soaking said articles;
applying a high pressure spray to said articles and
immersing said articles in an ultrasonic bath.