(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 341 766 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89200930.9**

(51) Int. Cl.[4]: **A47L 15/00**

(22) Date of filing: **13.04.89**

(30) Priority: **05.05.88 GB 8810628**

(43) Date of publication of application:
15.11.89 Bulletin 89/46

(84) Designated Contracting States:
CH DE ES FR GB IT LI NL SE

(71) Applicant: **UNILEVER NV**
Burgemeester s'Jacobplein 1 P.O. Box 760
NL-3000 DK Rotterdam(NL)

(84) **CH DE ES FR IT LI NL SE**

Applicant: **UNILEVER PLC**
Unilever House Blackfriars P.O. Box 68
London EC4P 4BQ(GB)

(84) **GB**

(72) Inventor: **Los, Leendert**
Molenvlietbrink 194
NL-3448 HS Woerden(NL)
Inventor: **Pritchard, Norman Jason**
Oud loosdrechtsedijk 251-9
NL-1231 LZ Loosdrecht(NL)

(74) Representative: **Tan, Bian An, Ir. et al**
Unilever N.V. Patent Division P.O. Box 137
NL-3130 AC Vlaardingen(NL)

(54) Mechanical warewashing process.

(57) An improved mechanical warewashing process and a mechanical warewashing machine for sequential washing of a series of loads each being subjected to a wash cycle in which it is doused with a wash liquor from a first liquid delivery system, the liquor being collected in a tank disposed below the load and then to a rinse cycle in which it is doused with rinse water from a second liquid delivery system, the wash cycle comprising a treatment during which the load is doused with a relatively small amount of concentrated wash liquor, followed by a soaking period. Preferably, the concentrated wash liquor is delivered via the second liquid delivery system.

EP 0 341 766 A2

MECHANICAL WAREWASHING PROCESS

The present invention relates to a mechanical warewashing process for sequential washing of a series of loads, each being subjected to a wash cycle in which it is doused with a wash liquor from a first liquid delivery system, the liquor being collected in a tank disposed below the load and then to a rinse cycle in which it is doused with rinse water from a second liquid delivery system.

To start up the process the machine wash tank is normally filled with water from a heated tank, referred to hereafter as booster. The cleaning agent is thereby added to the water via a pump to achieve a concentration in the tank of 0.5-5 g/l, based on the dry weight of the cleaning agent.

After the wash cycle, the wash liquor is stored in the tank waiting to be recycled for washing the next load. and the load is doused with hot rinse water from a second delivery system. Although the total volume of the wash liquor is normally much larger than that of the hot rinse water, the addition of hot rinse water in each subsequent cycle would lead to a continuously increasing total volume of wash liquor. Therefore, the tank is provided with an overflow pipe for limiting the liquid level therein.

Each cycle, the detergency power of the wash liquor is gradually reduced. First, because some is exhausted in removing soil and, second, because it is partially diluted by the rinse water. To make up for this loss in detergency power, the wash liquor is recharged with an alkaline- and/or surfactant-based cleaning agent by dissolution of a suitable amount of the cleaning agent in the wash liquor.

It will be appreciated that in such a mechanical warewashing process a relatively high concentration of wash liquor and a high temperature of normally 55-60 °C have to be maintained in order to obtain a satisfying cleaning effect in the short processing time desired, which is approximately 1-3 minutes.

We have now found that the efficiency of the above-mentioned process for mechanical warewashing can be significantly improved by the process according to the present invention.

The process of the invention is characterized in that the wash cycle comprises a treatment during which the load is doused with a relatively small amount of concentrated wash liquor, followed by a soaking period.

The amount of concentrated wash liquor is thereby related to the amount of detergency power which is lost during each wash cycle as a result of the wash process and the dilution of the wash liquor with rinse water. Thus the concentration of the cleaning agent in the wash liquor can be kept more or less constant.

Preferably, the concentrated wash liquor is delivered to the load from the second liquid delivery system, which is also used to deliver the rinse water. This second liquid delivery system is constructed to deliver much smaller volumes to the wash load than first liquid delivery system, hence it is more suitable to deliver the relatively small amount of concentrated wash liquor.

The process of the present invention allows the use of lower amounts of cleaning agent and/or lower wash liquor temperatures than in the known process, while equally satisfying results are obtained. The process is therefore favourable both from an economic and environmental point of view since the amount of cleaning agent used and/or the amount of energy consumed in the thermostated heater can be effectively reduced.

The concentrated wash liquor can be provided by diluting a concentrated liquid stock solution with water or alternatively, with wash liquor. Since it is preferred to deliver the concentrated wash liquor via the second liquid delivery system, it is also convenient to use rinse water for the preparation of the concentrated wash liquor.

In the process of the invention, the concentrated wash liquor is preferably 2-25 times as concentrated as the bulk of the wash liquor under normal operating conditions, which is about 0.5-5 g/l. It is especially preferred if the concentrated wash liquor is 5-10 times as concentrated as the bulk of the wash liquor under normal operation conditions. Dilution of the concentrated liquid stock solution to form the concentrated wash liquor can be carried out in a mixing chamber which is provided in the conducts leading to the spray arms. The dilution can be effected by pumping the liquid stock solution to the dilution chamber, where it is mixed with water or wash liquor. Alternatively, the mixing chamber may operate according to the Venturi principle, the concentrated liquid stock solution being sucked into the flow of the liquid proceeding to the delivery system.

Preferably, a minimal amount of concentrated wash liquor is used which is just sufficient to wet the load. For most mechanical dishwashing machines this amount is approximately 50-1500 ml. The amount required can be further reduced if the concentrated wash liquor is only sprayed onto the load from below. This is usually sufficient, because the cups, dishes, etc. are generally placed in the dishwasher with the most soiled side facing downwards. In this way, the cleaning potential of the concentrated wash liquor can be optimally exploited.

After the concentrated wash liquor has been

sprayed on to the wash load, it is allowed to soak for a short period, e.g. 0.5-10 seconds. However, in case of heavily soiled loads, soaking times of up to 10 minutes could be used. The soaking period can thus be varied according to the degree in which the wash load is soiled.

Additionally, other elements of the wash cycle can also be varied. For instance, a pre-treatment with wash liquor can be introduced. According to a particularly preferred process of the invention the wash cycle consists of a pre-wash cycle in which the load is doused with wash liquor, a cycle in which the load is doused with concentrated wash liquor, followed by a soaking period, and a wash cycle in which the load is doused with wash liquor.

The second liquid delivery system may in an analogous way additionally be used to spray a liquid sanitizer and/or bleach product on to the wash load. This has the advantage that by applying a small amount of a concentrated product to the wash load a very satisfying sanitizing and/or bleaching effect can be achieved. The total amount of sanitizer and/or bleach can in this case be less than in a process wherein the sanitizer and/or bleach product is contained in the wash liquor, because it is known that in the latter a considerable degradation of the sanitizer and/or bleach product occurs.

According to another aspect of the present invention, there is provided a mechanical warewashing machine suitable for carrying out the process of the invention.

The mechanical warewashing machine according to the invention comprises a tank for collecting the wash liquor, a first pump to deliver the wash liquor to first spray arms for dousing the wash load with wash liquor, a booster containing heated rinse water which can be sprayed on to the wash load via second spray arms, and is further characterized in that there are provided a second pump, connecting conducts and valves enabling the admixture of liquid detergent stock solution to the liquid proceeding from the booster to the second spray arms, preferably to the lower second spray arm only, in a controlled way.

The mechanical ware washing machine according to the invention may further comprise a third pump, connecting conducts and valves enabling the admixture of a liquid sanitizer and/or bleach product to the liquid proceeding from the booster to the second spray arms, preferably to the lower second spray arm only, in a controlled way.

The invention will now be better explained by referring to the following specific description in which the figure illustrates a mechanical warewashing machine according to the present invention.

The figure shows a mechanical warewashing machine (1) comprising a tank (2) which contains the wash liquor (3). During the wash cycle the first pump (4) delivers the wash liquor to the first spray arms (5,6) and the wash load is doused with wash liquor. Subsequently, the solenoid valves (7,8) are opened and the load is doused via second spray arms (9,10) with rinse water from the booster (11). The invention provides a second pump (12) to inject concentrated liquid stock solution via conducts (13,14) and non-return valves (15,16) into the liquid proceeding to the second spray arms (9,10). It will be evident that the warewashing machine according to the present invention allows the dousing of the wash load with concentrated wash liquor originating from the admixture of a small amount of concentrated stock solution of the cleaning agent to rinse water from the booster (7).

In a preferred embodiment of the mechanical warewashing machine according to the invention, the second pump is only connected to the lower second spray arm (9) via conduct (13). Consequently the concentrated liquor can only be delivered to the lower second spray arm (9).

Claims

1. A mechanical warewashing process for sequential washing of a series of loads, each being subjected to a wash cycle in which it is doused with a wash liquor from a first liquid delivery system, the liquor being collected in a tank disposed below the load and then to a rinse cycle in which it is doused with rinse water from a second liquid delivery system, characterized in that the wash cycle comprises a treatment during which the load is doused with a relatively small amount of concentrated wash liquor, followed by a soaking period.

2. Process according to Claim 1, characterized in that the concentrated wash liquor is delivered to the load via the second liquid delivery system.

3. Process according to Claim 2, characterized in that the concentrated wash liquor is prepared by dilution with rinse water.

4. Process according to Claims 1-3, characterized in that the concentrated wash liquor is 2-25 times as concentrated as the bulk of the wash liquor under normal operating conditions.

5. Process according to Claim 4, characterized in that the concentrated wash liquor is 5-10 times as concentrated as the bulk of the wash liquor under normal operating conditions.

6. Process according to Claims 1-5, characterized in that the concentrated wash liquor is sprayed on to the load from below.

7. Process according to Claims 1-6, characterized in that the wash cycle consists of a pre-wash cycle in which the load is doused with wash liquor,

a cycle in which the load is doused with concentrated wash liquor, followed by a soaking period, and a wash cycle in which the load is doused with wash liquor.

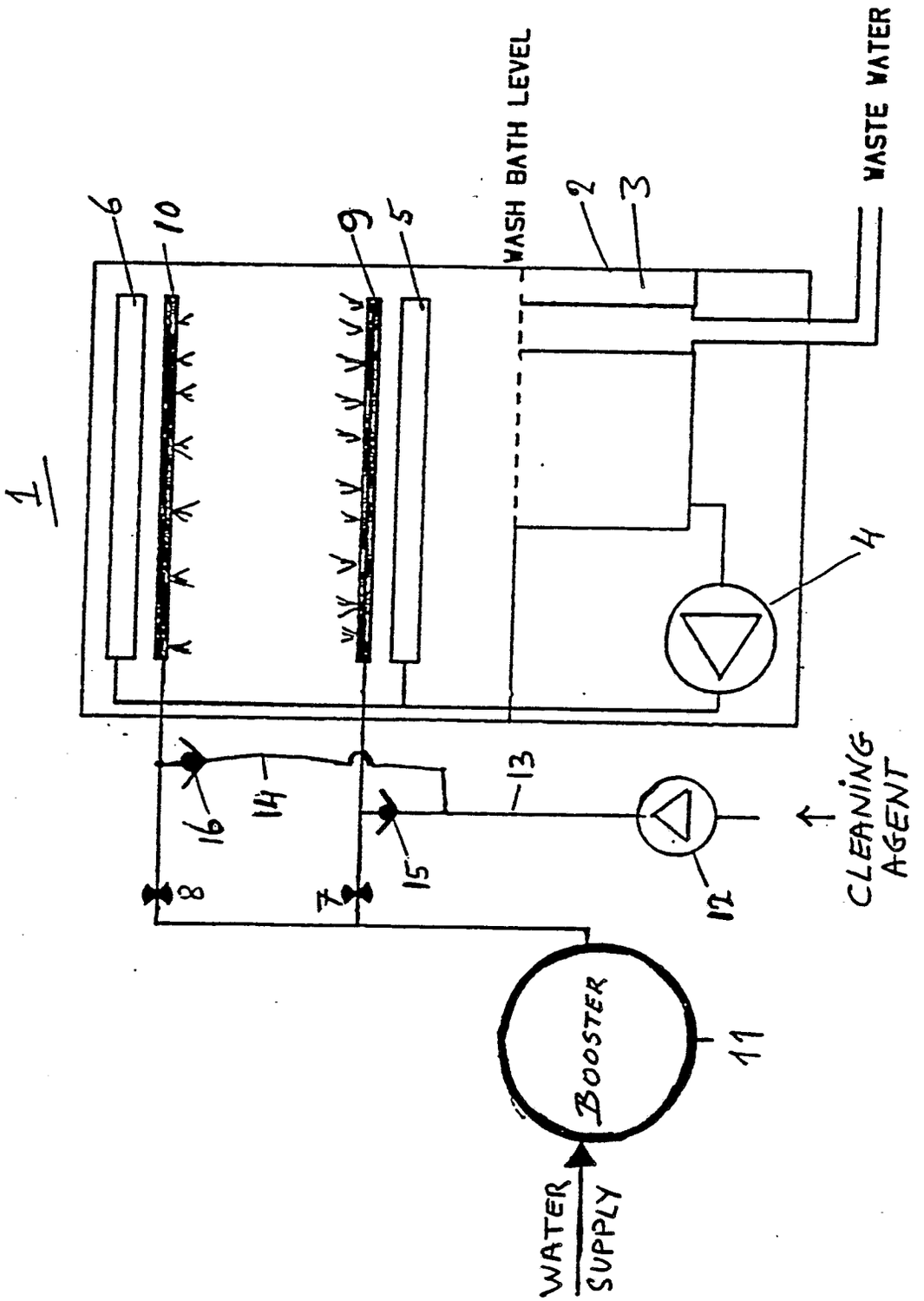
8. Process according to Claims 2-7, characterized in that after the wash cycle the load is doused with a liquid sanitizer and/or bleach product which is delivered via the second liquid delivery system.

9. A mechanical warewashing machine (1) for sequential washing of a series of loads, said machine comprising a tank (2) for collecting the wash liquor, a first pump (4) to deliver the wash liquor to first spray arms (5,6) for dousing the wash load with wash liquor, a booster (11) containing heated rinse water which can be sprayed onto the wash load via second spray arms (9,10), further characterized in that there are provided a second pump (12), connecting conducts (13,14) and valves (15,16) enabling the admixture of liquid cleaning agent stock solution to the liquid proceeding from the booster (11) to the second spray arms (9,10) in a controlled way.

10. Machine according to Claim 9, characterized in that the second pump (12) is only connected via connecting conduct (13) and valve (15) to the lower second spray arm (9).

11. Machine according to Claims 9-10, characterized in that there is provided a third pump, connecting conducts and valves enabling the admixture of a concentrated liquid sanitizer and/or bleach product to the second spray arms.

12. Machine according to Claim 11, characterized in that the third pump is only connected to the lower second spray arm.


1
6
10
9
5
WASH BATH LEVEL
2
3
WASTE WATER
4
16
14
13
15
8
7
12
CLEANING AGENT
BOOSTER
11
WATER SUPPLY