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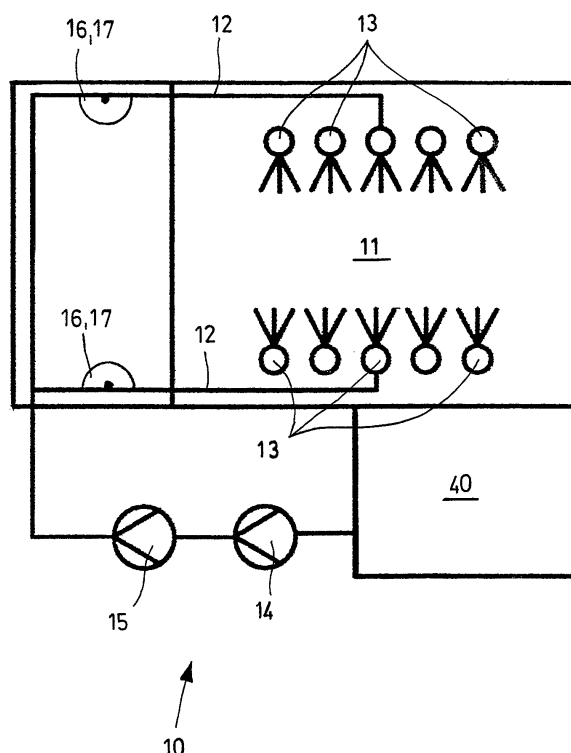
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(54) **Machine and washing process for dishes and other ware**

(57) A washing machine (10, 100) for dishes and/or other ware comprising at least one washing area (11) equipped with supply means (12, 13) of a liquid substance on said dishes and/or said other ware, there also

being at least two centrifugal feeding pumps (14, 15) of the liquid substance under pressure in the supply means (12, 13), wherein the at least two centrifugal pumps (14, 15) are positioned in series one after the other and can be independently activated.



**Fig.1**

## Description

**[0001]** The present invention relates to a washing machine for dishes and other ware and to the washing process using said machine.

**[0002]** There are currently various types of dishwashers which comprise a washing area, equipped with fixed or moveable nozzles for the supply of a liquid substance, generally water mixed with detergents/cleansing agents, and a pump connected to the above nozzles for the pressurized feeding of the same liquid substance.

**[0003]** Depending on the power of the electro-mechanical components installed in these washing machines, and in particular with reference to the power of the pump, they are commonly divided into two categories suitable for two different and distinct uses.

**[0004]** A first category relates to washing machines which assemble a medium/low-power pump, for example about 500-3000 Watt, which are used exclusively for the washing of dishes.

**[0005]** Due to the usual low degree of dirt normally present on dishes, in fact, a medium/low pressure of the washing/rinsing liquid guarantees the normal hygiene standard level required in these washings.

**[0006]** A possible greater pressure, associated with the higher level of power used, than that required above is totally superfluous and disadvantageous obtaining the same result with greater expenses.

**[0007]** The second category relates to washing machines which assemble a medium/high-power pumping group, for example about 3000-6000 Watt, which are used for the washing of saucepans, containers, cooking utensils, etc. which normally have a much greater degree of dirt than dishes.

**[0008]** These washing machines are commonly called "warewashers" indicating the fact that they are capable of cleaning the above elements which will be called herein with the term "other items", which differ in the greater degree of dirt with respect to that present on dishes.

**[0009]** It should be pointed out that in these warewashers, a medium/low-power pump could not guarantee an adequate pressure for reaching the hygiene standard level required in these washings.

**[0010]** It is therefore evident that in the present state of the art there are no dishwashers capable of correctly washing the above-mentioned "other ware", as they have low-power pumps to avoid energy waste, and there are no warewashers capable of cleaning normal dishes without energy waste associated with a necessary power-dimensioning of the pump much higher than that required for washing dishes.

**[0011]** In other words, at present there are no machines having a high efficiency with which it is possible to wash both dishes and the above "other ware", obtaining either a limited cleaning, by washing the other ware with normal dishes, or excessive power consumption and therefore unnecessary high costs, by washing dishes with common warewashers.

**[0012]** There are currently two different forms for both dishwashers and warewashers.

**[0013]** In the former, the machines comprise a single operating station suitable for both washing and rinsing, whereas the second category comprises so-called "tunnel machines" in which the washing and rinsing stations are distinct and separate areas.

**[0014]** The latter tunnel machines generally consist of three main functioning areas situated in series, pre-washing, washing and rinsing respectively, through which, during the functioning of the machine, the dishes or "other ware" pass, depending on the power of the pump installed, situated on specific moving means, such as conveyor belts or baskets.

**[0015]** As already specified above, whether they be single-station washing machines or tunnel washing machines, at present there are no washing machines suitable for washing both dishes and other ware without having to resort to incorrect washings or with high energy consumption.

**[0016]** An objective of the present invention is to provide a device capable of solving the above drawbacks of the known art in an extremely simple, economical and particular functional way.

**[0017]** Another objective of the invention is to provide a machine and washing process for dishes and other ware capable of correctly cleaning both the dishes and other ware using the necessary power each time without energy waste.

**[0018]** These objectives according to the present invention are achieved by providing a machine and washing process for dishes and other ware as specified in claims 1 and 10 respectively.

**[0019]** Further characteristics of the invention are indicated in the dependent claims.

**[0020]** The characteristics and advantages of a machine and washing process for dishes and other ware according to the present invention will appear more evident from the following, illustrative and non-limiting description, referring to the enclosed schematic drawings, in which:

figure 1 is a schematic view of an embodiment example of a single-station washing machine for dishes and other ware according to the present invention; figure 2 is a schematic view of an embodiment example of a tunnel washing machine for dishes and other ware according to the present invention.

**[0021]** With reference to figure 1, this shows a single-station washing machine 10 for dishes and other ware according to the present invention, whereas figure 2 shows a tunnel washing machine 100 for dishes and other ware according to the present invention.

**[0022]** The washing machine 10, 100 for dishes and/or other ware according to the present invention comprises at least one washing area 11 equipped with supply means 12, 13 of a liquid substance, generally water or water

mixed with detergents, suitable for being distributed under pressure on the dishes and/or other ware to be washed.

**[0023]** According to two different embodiments, the washing machine 10 is a single-station washing machine 10, whereas the washing machine 100 is a tunnel washing machine.

**[0024]** In particular, according to the present invention, the washing machine 10, 100 for dishes and/or other ware for distributing the above liquid substance, according to a pressure established each time, on the dishes and/or other ware to be washed, also comprises at least two centrifugal feeding pumps 14, 15 connected to the supply means 12, 13, said pumps being situated in series one after another and can be independently activated.

**[0025]** The powers of the above at least two centrifugal pumps 14, 15 can be the same or different and, as already mentioned, can be independently activated for producing various configurations of use, or different supply pressures of the liquid substance, according to the requirements.

**[0026]** In particular, with reference to the embodiment examples provided in figures 1 and 2, in which there are two centrifugal pumps 14, 15 in series one after another for the pressurized feeding of the liquid substance into the supply means 12, 13, as there are two centrifugal pumps 14, 15 in series, and assuming they have different powers, three different pressure supply levels of the liquid substance can be produced in the supply means 12, 13.

**[0027]** It is in fact possible to activate exclusively the first pump 14, both pumps 14, 15 contemporaneously, or alternatively only the second pump 15.

**[0028]** Consequently there are advantageously three different pressure supply levels of the liquid substance to the supply means 12, 13, according to the examples shown, which will therefore allow a washing of dishes and/or other ware to be effected without energy waste but calibrating the pressure, and consequently the energy consumption, each time in relation to what is to be washed and the degree of dirt.

**[0029]** In particular, in these examples, it is sufficient to activate only one pump, the first 14 or the second 15, if there are exclusively dishes to be washed, or, if there is other dirtier ware to be washed it is sufficient to activate both of the two pumps 14 and 15 contemporaneously to obtain a correct washing and supply a greater pressure, associated with higher costs, only if required as necessary.

**[0030]** Consequently according to the two possibilities indicated above, the washing machine 10, 100 in accordance with the present invention allows both dishes and other dirtier ware to be washed, always obtaining an optimum cleaning degree without wasting energy by feeding the supply means 12, 13 each time with an optimal pressure for the desired washing.

**[0031]** Any possible energy waste is in fact minimized by activating, according to the requirements, one or more pumps of the at least two pumps 14, 15 present, in relation

to the ware to be washed.

**[0032]** The activation, depending on the requirements, of the above at least two pumps 14, 15 is therefore of particular importance and, according to the present invention, said activation can be manual or, alternatively, automatic.

**[0033]** According to this latter possibility, the washing machine 10, 100 according to the invention also comprises automatic activation means 16, 17 of the at least two centrifugal pumps 14, 15.

**[0034]** Said automatic activation means 16, 17 of the at least two centrifugal pumps 14, 15 can, for example, be at least one optical sensor 16 electronically connected to the at least two centrifugal pumps 14, 15, or alternatively they can be at least one captive sensor 17, also electronically connected to the at least two centrifugal pumps 14, 15.

**[0035]** As can be seen in figure 1 and 2, said at least one optical sensor 16 or said at least one captive sensor 17 are preferably positioned at the entrance of the washing area 11 to analyze the degree of dirt of the ware entering the washing area 11 itself.

**[0036]** According to these examples, it is therefore these automatic activation means 16, 17 which define the degree of dirt present on the dishes or other ware to be washed and consequently control the activation of one or more pumps until a pressure supply level of the liquid to the supply means 12, 13 is reached, which allows a correct washing in relation to the degree of dirt without energy waste.

**[0037]** According to the preferred embodiment shown in figure 2, the machine 100 is a tunnel washing machine 100 and, in addition to the washing area 11, comprises a pre-washing area 20 and at least one rinsing area 21.

**[0038]** During the functioning of the machine 100, the dishes and/or other ware to be washed, possibly positioned on specific transporting means, such as conveyor belts or baskets, pass through these areas, according to the succession shown in figure 2.

**[0039]** The stations of the pre-washing area 20 and washing area 11 have a pre-washing tank 22, a washing tank 23 respectively, to which they are connected by at least one pump 24, and by the above at least two pumps 14, 15, respectively.

**[0040]** According to a preferred embodiment, the supply means 12, 13 connected to the at least two pumps 14, 15 are spray nozzles 13 situated on specific collector arms 12.

**[0041]** The rinsing station 21, in particular, is equipped with a rinsing tank 30 connected by a pump 31 to an upper transversal collector arm 25 and a lower transversal collector arm 26, each equipped with a plurality of spray nozzles 27.

**[0042]** According to the present invention, the rinsing station 21 advantageously also has at least one additional supply arm 28, 29 which can be activated or deactivated in relation to the advance rate of the dishes.

**[0043]** Said supply arm 28, 29 is activated when the

machine functions with a high feeding rate of the dishes and is deactivated at a low speed.

[0044] The rinsing station 21 also comprises at least one regulation valve 32 suitable for activating or deactivating the supply arm 28, 29 in relation to the advance rate of the dishes.

[0045] Furthermore, again in the rinsing station 21, there is also a boiler 33, or an equivalent means, for heating the water to be supplied during the rinsing, at least one electrovalve 34 for closing or opening the connection with the water supply which feeds the rinsing water.

[0046] In the embodiment of figure 1, which shows a single-station washing machine 10, both the pre-washing and the rinsing are effected in the same washing area 11 with the difference that the pressurized liquid substance supplied is different each time and suitable for the treatment required and taken from a relative tank 40.

[0047] The functioning of the device object of the invention can be easily understood.

[0048] The washing process for dishes and other ware by means of a washing machine 10, 100 as described above and object of the present invention, comprises the following phases:

- a) introducing the dishes and/or other ware into the washing area 11 of the machine 10, 100;
- b) analyzing the degree of dirt present on the dishes and/or on the other ware; and
- c) activating at least one of the at least two centrifugal pumps 14, 15.

[0049] As can be clearly seen with the washing machine 10, 100, object of the present invention, it is possible to wash both normal dishes and also other ware by selectively activating at least one of the at least two centrifugal pumps 14, 15 depending on the degree of dirt present on the dishes and/or other ware.

[0050] In particular, the energy power consumed for pressurizing the washing/rinsing liquid is therefore correctly dimensioned each time to the required washing level.

[0051] According to preferred embodiments, the phase of introducing the dishes and/or other ware into the washing area 11 can be effected manually, as in the presence of the single-station washing machine 10 shown in figure 1, or automatically, as in the presence of the tunnel washing machine 100 shown in figure 2.

[0052] Furthermore, the phase of analyzing the degree of dirt present on the dishes and/or other ware can also advantageously be effected automatically, for example by means of at least one optical sensor 16 electronically connected to the at least two centrifugal pumps 14, 15, or by means of at least one captive sensor 17 also electronically connected to the at least two centrifugal pumps 14, 15.

[0053] Once the pressure necessary for effecting a correct washing has been identified, the activation phase of at least one of the two centrifugal pumps 14, 15 for

obtaining said required pressure without energy waste can be effected manually or automatically through the above automatic activation means 16, 17.

[0054] In this way, according to the invention, with a single washing machine 10, 100, it is possible to wash both dishes and other articles which are generally dirtier, by generating an adequate supply pressure each time to the supply means and consequently without any energy waste caused, for example, by possible excessive pressure during the washing of dishes alone.

[0055] It can thus be seen that a machine and washing process for dishes and other ware according to the present invention achieve the objectives previously specified.

[0056] The machine and washing process for dishes and other ware of the present invention thus conceived can undergo numerous modifications and variants, all included in the same inventive concept; furthermore, all the details can be substituted by technically equivalent elements. In practice, the materials used, as also their dimensions, can vary according to technical requirements.

## Claims

1. A washing machine (10, 100) for dishes and/or other ware comprising at least one washing area (11) equipped with supply means (12, 13) of a liquid substance on said dishes and/or said other ware, **characterized in that** said washing machine (10, 100) also comprises at least two centrifugal feeding pumps (14, 15) of said liquid substance under pressure in said supply means (12, 13), wherein said at least two centrifugal pumps (14, 15) are positioned in series one after the other and can be independently activated.
2. The washing machine (10, 100) according to claim 1, **characterized in that** it is a single-station washing machine (10).
3. The washing machine (10, 100) according to claim 1, **characterized in that** it is a tunnel washing machine (100).
4. The washing machine (100) according to claim 3, **characterized in that** it also comprises at least one pre-washing area (20) and at least one rinsing area (21) equipped with an upper transversal arm (25) and a lower transversal arm (26) both equipped with spray nozzles (27).
5. The washing machine (100) according to claim 4, **characterized in that** it also comprises at least one additional supply arm (27, 28), equipped with spray nozzles (27), which can be activated or deactivated in relation to the advance rate of the dishes.

6. The washing machine (100) according to claim 4, **characterized in that** it also comprises at least one rinsing valve (32), connected to said additional arm (7, 8), for activating or deactivating said additional arm (7, 8) in relation to the advance rate of the dishes. 5
7. The washing machine (10, 100) according to any of the previous claims, **characterized in that** it also comprises automatic activation means (16, 17) of at least one of said at least two centrifugal pumps (14, 15). 10
8. The washing machine (10, 100) according to claim 7, **characterized in that** said automatic activation means are at least one optical sensor (16) electronically connected to said at least two centrifugal pumps (14, 15). 15
9. The washing machine (10, 100) according to claim 7, **characterized in that** said automatic activation means are at least one captive sensor (17) electronically connected to said at least two centrifugal pumps (14, 15). 20
10. A washing process for dishes and other ware by means of a washing machine (10, 100) according to any of the previous claims, comprising the following phases: 25
  - a) introducing the dishes and/or other ware into said washing area (11); 30
  - b) analyzing the degree of dirt present on said dishes and/or on said other ware; and
  - c) activating at least one of said at least two centrifugal pumps (14, 15). 35
11. The washing process according to claim 10, **characterized in that** said phase of introducing said dishes and/or other ware into said washing area (11) is effected manually. 40
12. The washing process according to claim 10, **characterized in that** said phase of introducing said dishes and/or other ware into said washing area (11) is effected automatically. 45
13. The washing process according to claim 10, **characterized in that** said phase of analyzing the degree of dirt present in said dishes and/or said other ware is effected automatically. 50
14. The washing process according to claim 13, **characterized in that** said phase of analyzing the degree of dirt present in said dishes and/or said other ware is effected automatically by means of at least one optical sensor (16) electronically connected to said at least two centrifugal pumps (14, 15). 55
15. The washing process according to claim 13, **characterized in that** said phase of analyzing the degree of dirt present in said dishes and/or said other ware is effected automatically by means of at least one captive sensor (17) electronically connected to said at least two centrifugal pumps (14, 15).
16. The washing process according to claim 10, **characterized in that** said phase of activating at least one of said at least two centrifugal pumps (14, 15) is effected manually.
17. The washing process according to claim 10, **characterized in that** said phase of activating at least one of said at least two centrifugal pumps (14, 15) is effected automatically by means of said automatic activation means (16, 17).

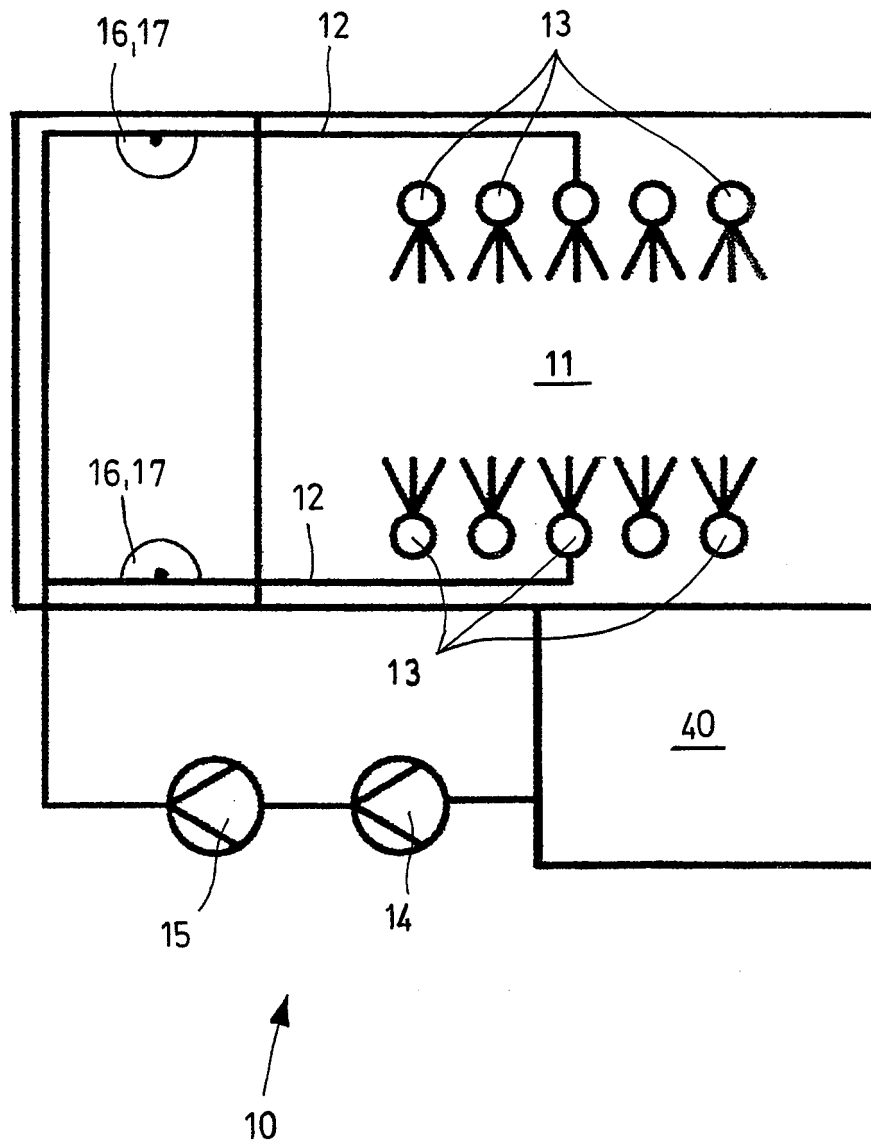


Fig.1

