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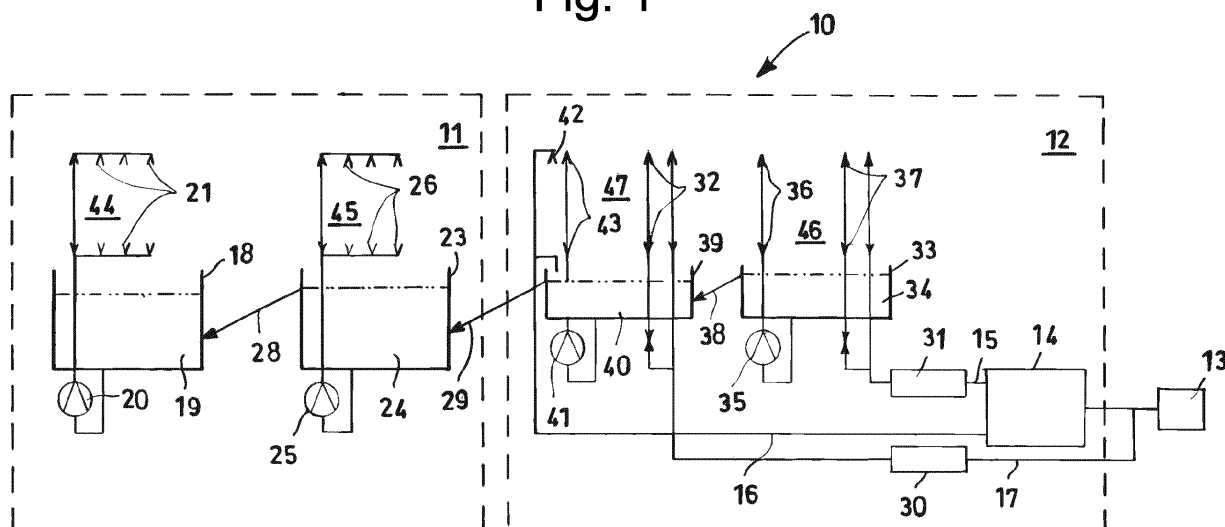
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(54) **Improved rinsing module with final rinsing using demineralised water, relative improved rinsing method and tunnel dishwasher machine provided with such improved rinsing module**

(57) Rinsing module for dishwasher machines (10) of the tunnel type of the type comprising a pre-rinsing sub-area (47) and a final rinsing sub-area (46), in succession along the advancement of the dishes, said module further comprising a demineralising device (14) supplied by network water (13) for the generation of dem-

ineralised water (15) and extra-mineralised water (16); means for supplying said demineralised water (15) in said final rinsing sub-area (46) being provided, in which means for supplying said extra-mineralised water (16) in said pre-rinsing sub-area (47) are provided.

Fig. 1



Description

[0001] The present invention refers to an improved rinsing module with final rinsing using demineralised water, to the relative improved rinsing method and to a tunnel dishwasher machine provided with such improved rinsing module with final rinsing using demineralised water. Dishwasher machines of the tunnel type with final rinsing using demineralised water are currently known comprising a washing area and a rinsing area in succession along the advancement of the dishes.

[0002] For generating demineralised water, such dishwasher machines further comprise, on board or externally, a demineralising device, generally of the osmotic or filter type, supplied by the network water.

[0003] Such demineralising device generates, starting from a unit of the network water, a fraction of demineralised water and a complementary fraction of extra-mineralised water.

[0004] In a known manner, the fraction of demineralised water is used in the step of final rinsing while the fraction of extra-mineralised water is sent to the discharge.

[0005] For washing and pre-rinsing steps it is known to use either only the network water or a mixture of network water and solutions of network water used in other steps of use of the dishwashers.

[0006] US4156621 describes a tunnel dishwasher machine provided with a demineralising device capable of generating a fraction of demineralised water and a complementary fraction of extra-mineralised water. According to US4156621 - as clearly described in particular in column 3, lines 11-20 - the fraction of demineralised water is sent to the final rinsing, while the fraction of extra-mineralised water is sent to the washing or pre-washing area.

[0007] Starting from said prior art, the object of the present invention is to provide an improved rinsing module with final rinsing using demineralised water that is alternative to the known ones and allowing to require lower amounts of network water, with the same or greater resulting quality.

[0008] In general, these objects according to the present invention are attained by using, in the steps of pre-rinsing, the extra-mineralised water usually delivered to discharge.

[0009] Thus, by using the extra-mineralised water as at least a partial pre-rinsing element, it is well known that the required amount of network water is much lower than in the analogous machines currently available in the market.

[0010] Further characteristics of the invention are outlined by the dependent claims.

[0011] The characteristics and advantages of an improved rinsing module with final rinsing using demineralised water according to the present invention shall be more apparent from the following exemplifying and non-limiting description with reference to the attached schematic drawings wherein:

- figure 1 is a schematic view of an embodiment of an improved dishwasher machine with final rinsing using demineralised water according to the present invention.

[0012] With reference to figure 1, an embodiment of a tunnel dishwasher machine provided with an improved rinsing module with final rinsing using demineralised water according to the present invention is shown with 10.

[0013] The dishwasher machine 10 is of the tunnel type and comprises in succession - along the advancement of the dishes - a washing area 11 and a rinsing area 12 where a final rinsing sub-area 46 supplied with demineralised water is present.

[0014] As clearly specified hereinafter, the rinsing area 12 is actually an independent module integrating all devices required for the independent operation thereof. In order to obtain this final rinsing 46, which confers to the dishes a particular brilliance, the rinsing module further comprises a demineralising device 14, per se known, supplied by the network water 13.

[0015] For each unit of network water 13 supplied to the demineralising device 14 demineralised water 15 and extra-mineralised water 16 are generated.

[0016] As known, means for supplying the demineralised water 15 are provided in the final rinsing sub-area 46 of the rinsing module.

[0017] In particular, the demineralised water 15, after being possibly heated by a boiler 31, is supplied to nozzles 37 for the final rinsing which discharge into a final rinsing tank 33. The contents 34 of such final rinsing tank 33 are supplied by means of a final rinsing pump 35 to further final rinsing nozzles 36 which also discharge into the final rinsing tank 33.

[0018] Thus, i.e. using the same demineralised water 15 several times, a low amount thereof is required.

[0019] According to the invention the extra-mineralised water 16 usually delivered to the discharge or to the washing area is innovatively used in the pre-rinsing sub-area 47 of the rinsing module upstream of the final rinsing sub-area 46.

[0020] By using such extra-mineralised water 16 for some functions currently executed by the network water only, it is immediately observable that the machine of the present invention requires, with the same result, a lower consumption of network water 13.

[0021] According to the example of figure 1 the washing area 11 comprises a pre-washing sub-area 44 and a final washing sub-area 45, in succession along the advancement of the dishes.

[0022] The pre-washing sub-area 44 comprises at least one pre-washing nozzle 21, a pre-washing tank 18 and a pump 20 for delivering the pre-washing liquid 19 contained in a pre-washing tank 18 to the at least one pre-washing nozzle 21.

[0023] The final washing sub-area 45 comprises in turn at least one washing nozzle 26, a washing tank 23 and a pump 25 for delivering the washing liquid 24 contained

in the washing tank 23 to the at least one washing nozzle 26.

[0024] The rinsing module 12 comprises - in succession along the advancement of the dishes - a pre-rinsing sub-area 47 and a final rinsing sub-area 46, previously described and supplied by the demineralised water.

[0025] The pre-rinsing sub-area 47 comprises at least one pre-rinsing nozzle 32, supplied by the network water 13, which discharges into a pre-rinsing tank 39.

[0026] A pump 41 for delivering the pre-rinsing liquid 40 contained in the pre-rinsing tank 39 and at least one further pre-rinsing nozzle 43 are provided.

[0027] According to such embodiment of the invention the extra-mineralised water 16 is supplied into the pre-rinsing tank 39 directly or through dedicated nozzles 42.

[0028] In addition, the pre-rinsing area 39 may also be supplied by the network water 13 possibly heated by a boiler 30.

[0029] Thus, the pump 41 circulates in the pre-rinsing sub-area 47 both the network water 13 and the extra-mineralised water 16.

[0030] For overflowing along the channel 38, the pre-rinsing tank 40 may also be supplied by the liquid flowing out from the final rinsing tank 33.

[0031] Such second embodiment is particularly advantageous given that the rinsing area 12 may be obtained as an entirely independent rinsing module. Indeed, as observable, all the supplies provided, with network water 13, extra-mineralised water 16 and demineralised water 15, are integrated in said area 12.

[0032] Thus, according to the description, the dishes - during their passage - are impacted by water jets with different degrees of hardness, in particular decreasing from pre-washing to the final rinsing.

[0033] Thus, the operation of the rinsing module of the present invention and of the tunnel dishwasher machine provided with such module is immediately observable. Such rinsing module implements a method comprising the main and subsequent steps of:

- pre-rinsing the dishes; and
- rinsing the dishes;

and the preliminary step of generating demineralised water and extra-mineralised water starting from the network water.

[0034] According to the invention it is provided to use demineralised water in the step of final rinsing and extra-mineralised water in the step of pre-rinsing of the dishes.

[0035] Obviously, the use of at least part of the extra-mineralised water is not excluded also in the step of washing the dishes.

[0036] In particular in this case, the step of washing the dishes may comprise the steps of:

- pre-washing the dishes; and
- washing the pre-washed dishes;

wherein at least one of such steps of pre-washing the dishes and washing the dishes is implemented through the use of the extra-mineralised water.

[0037] Lastly, it should be observed that mixing the demineralised water and the extra-mineralised water allows to recreate the original conditions of the network water and this allows to use detergents for normal water and not for demineralised water, which are usually more expensive and difficult to find.

[0038] It has thus been observed that the improved rinsing module with final rinsing using demineralised water according to the present invention attains the previously described purposes.

[0039] The improved rinsing module with final rinsing using demineralised water of the present invention thus conceived can be subjected to many modifications and variants, all falling within the same inventive concept; furthermore, all details can be replaced by technically equivalent elements. In practice, the materials used, as well as the dimensions thereof, may vary according to the technical requirements.

Claims

1. Rinsing module for dishwasher machines (10) of the tunnel type of the type comprising a pre-rinsing sub-area (47) and a final rinsing sub-area (46), in succession along the advancement of the dishes, said module further comprising a demineralising device (14) supplied by the network water (13) for the generation of demineralised water (15) and extra-mineralised water (16); means for supplying said demineralised water (15) in said final rinsing sub-area (46) being provided, **characterised in that** it comprises means for supplying said extra-mineralised water (16) in said pre-rinsing sub-area (47).
2. Rinsing module according to claim 1 **characterised in that** said pre-rinsing sub-area (47) comprises at least one pre-rinsing nozzle (32, 43), a pre-rinsing tank (39) and a pump (41) for delivering the pre-rinsing liquid (40) contained in said pre-rinsing tank (39) to said at least one pre-rinsing nozzle (43); said final rinsing sub-area (46) comprising at least one rinsing nozzle (36, 37), a rinsing tank (33) and a pump (35) for delivering the rinsing liquid (34) contained in said rinsing tank (33) to said at least one rinsing nozzle (36); said extra-mineralised water (16) being supplied into said pre-rinsing tank (39).
3. Rinsing module according to claim 2 **characterised in that** said pre-rinsing tank (39) is also supplied by the network water (13).
4. Rinsing module according to claim 2 **characterised in that** said extra-mineralised water (16) is supplied directly into said pre-rinsing tank (39) or through nozzle (43).

zles (42) for supplying extra-mineralised water arranged at said pre-rinsing tank (39).

5. Rinsing method implemented by a module according to any one of the preceding claims, said method comprising the steps of:
 - pre-rinsing the dishes; and
 - rinsing the pre-rinsed dishes

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said method also comprising the step of generating demineralised water and extra-mineralised water starting from the network water, said step of rinsing the pre-rinsed dishes being obtained by dispensing said demineralised water,

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characterised in that said step of pre-rinsing the dishes is obtained by dispensing said extra-mineralised water.

6. Rinsing method according to claim 5 **characterised in that** said step of pre-rinsing the dishes is obtained by dispensing said extra-mineralised water and network water.

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7. Dishwasher machine (10) of the tunnel type comprising a washing area (11) and a rinsing area (12), in succession along the advancement of the dishes, **characterised in that** said rinsing area (12) is obtained as a module according to any one of claims 1 to 4.

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8. Dishwasher machine (10) according to claim 7 **characterised in that** said washing area (11) comprises a pre-washing sub-area (44) and a final washing sub-area (45), in succession along the advancement of the dishes; said pre-washing sub-area (44) comprising at least one pre-washing nozzle (21), a pre-washing tank (18) and a pump (20) for delivering the pre-washing liquid (19) contained in said pre-washing tank (18) to said at least one pre-washing nozzle (21); said final washing sub-area (45) comprising at least one washing nozzle (26), a washing tank (23) and a pump (25) for delivering the washing liquid (24) contained in said washing tank (23) to said at least one washing nozzle (26).

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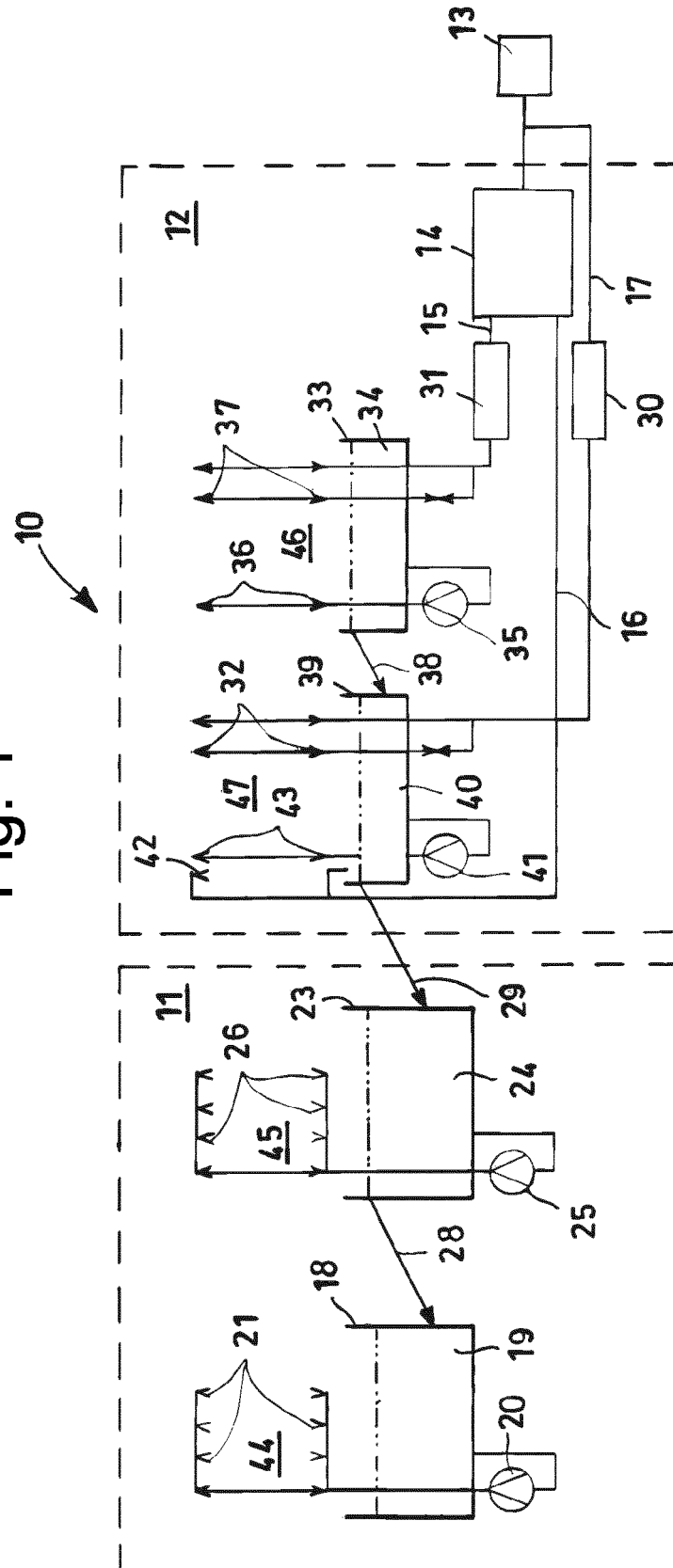
9. Dishwasher machine (10) according to claim 8 **characterised in that** it comprises means for supplying said extra-mineralised water (16) also to at least one of said washing and pre-washing tanks (18, 23).

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10. Dishwasher machine (10) according to claim 9 **characterised in that** said extra-mineralised water (16) is supplied into at least one of said washing and pre-washing tanks (18, 23) through nozzles (22, 27) for supplying extra-mineralised water arranged at at least one of said washing and pre-washing tanks (18, 23).

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Fig. 1





EUROPEAN SEARCH REPORT

Application Number
EP 14 15 7064

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 June 2014	Examiner Lopez Vega, Javier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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