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(54) Dishwasher with washing tank divisible into two sectors

(57) A dishwasher includes an electrovalve (W) controlling the entrance of water from the network, a water softening unit (A, R, S), a washing tank, a drain duct (D) and a microprocessor, in the washing tank there being provided two racks (R, R') side by side and a removable central dividing baffle (S) which performs the division of the tank into two independent sectors (T, T') each of which is provided with a collecting sump with relevant filter from which the water reaches a wash pump (WP; WP') and a drain pump (DP; DP'), a heating resistor (H; H'), a detergent distributor, a top sprinkler (U; U') and a bottom sprinkler (L; L'). The feeding of the water coming from the softening unit takes place through a deviating

valve (VD) which directs the water to the respective supply ducts of the sectors (T, T') and the draining takes place through a connector (Y) which converges the drain ducts of the two sectors (T, T') into the common drain duct (D), and there is also provided a four-way valved manifold (C) which puts in communication the two sectors (T, T'). In this way each of the two sectors can operate according to its own cycle with specific parameters of temperature, duration and type of detergent even in different moments with respect to the other sector, and when using only one sector the machine can actually operate at half load with an energy saving close to 50%.

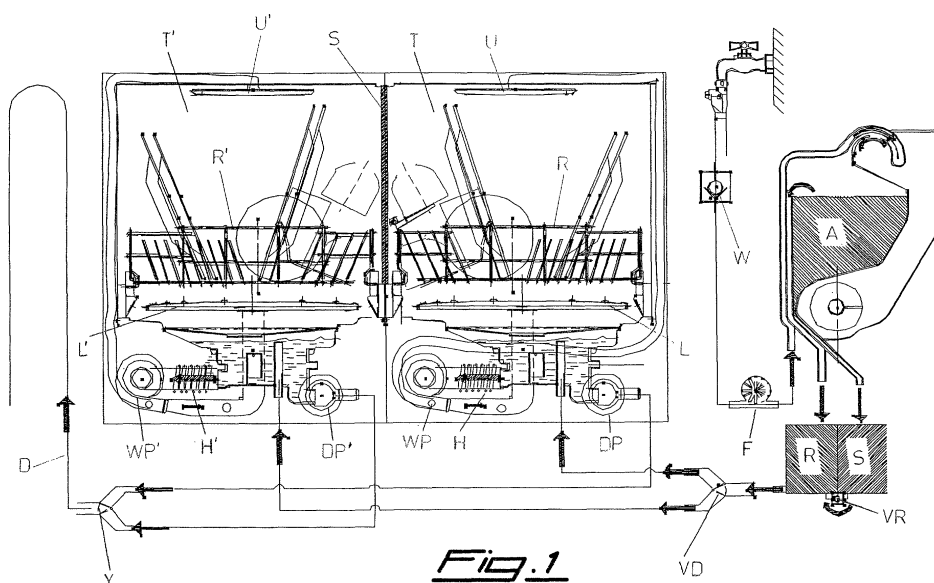


Fig. 1

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Description

[0001] The present invention relates to dishwashing machines, and in particular to a dishwasher for domestic use provided with means for dividing the washing tank into two sectors which can be used separately.

[0002] It is known that dishwashers for domestic use are provided with various arrangements for adapting them to the number and type of dishes to be washed, such as the setting of low-temperature, or energy-recovery, cycles or the feeding of one sprinkler only and so on. Regardless of the adopted solution, in known dishwashers the washing affects the whole tank and therefore the whole structure of the machine is heated through the contact with hot water.

[0003] As a consequence, the actual energy saving with respect to the conventional full load operation does not exceed 20%. Moreover, it is not possible to differentiate the type of washing between the two racks as to temperature, jet pressure and detergent since there is a single washing circuit fed by a single wash pump. Theoretically, a certain degree of differentiation could be achieved by changing the temperature and washing time together with the alternate feeding of the sprinklers, but this implies a more complicated circuit and a significant extension of the cycle length.

[0004] Therefore the object of the present invention is to provide a dishwasher which overcomes the above-mentioned drawbacks.

[0005] This object is achieved by means of a dishwasher provided with means for dividing the washing tank into two sectors which can operate independently one of the other. Other advantageous features are disclosed in the dependent claims.

[0006] The main advantage of the dishwasher according to the present invention is exactly that of being able to achieve a total operating differentiation between the two sectors, each of which can operate according to its own cycle with specific parameters of temperature, duration and type of detergent even in different moments with respect to the other sector.

[0007] A second significant advantage of this dishwasher is that it can actually operate at half load, heating only half of the machine with an energy saving close to 50%.

[0008] A further advantage of this type of machine stems from the fact that when the tank is undivided and the operation is conventional it still achieves better washing results thanks to the plurality of sprinklers and filters.

[0009] These and other advantages and characteristics of the dishwasher according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

their connections; and

Fig.2 is a view similar to the preceding one showing in detail the connection system between the two sectors of said dishwasher.

[0010] Referring to Fig.1, there is seen that a dishwasher according to the invention conventionally includes a plurality of known elements: an electrovalve W controlling the entrance of water from the network, a meter F which measures the amount of water entering the machine, a unit for softening the water by means of de-calcifying resins located in a container R", which includes a chamber A for the collection of water intended for the regeneration of said resins by means of a sodium chloride solution which is formed in a salt container S connected to container R" through an electrovalve VR, and a drain duct D.

[0011] The novel aspect of the present dishwasher consists of a horizontally extending washing tank with two racks R, R' side by side rather than one on top of the other, and a removable central dividing baffle S which performs the division of the tank into two independent sectors T, T'.

[0012] In fact in each of the two sectors there are provided all the elements required for the individual operation: a collecting sump from which the water reaches a wash pump WP and WP' and a drain pump DP and DP', a heating resistor H and H', a bottom sprinkler L and L' and a top sprinkler U and U'. The feeding of the water coming from the common softening unit takes place through a deviating valve VD which directs the water to the respective supply ducts, and similarly the draining takes place through a connector Y which converges the drain ducts of the two sectors into the common drain duct D.

[0013] It is obvious that also other elements not illustrated in the figure are provided, such as temperature sensors, pressure switches, a microprocessor to control the operation of the machine and so on.

[0014] It should be noted that in the absence of the baffle S it would be possible to use a single rack, having a width equal to the tank width, which is capable of receiving particularly large dishes, i.e. having a side longer than 60 cm, which can not presently be washed in the domestic dishwashers available on the market.

[0015] Furthermore, the fact of having two smaller collecting sumps allows to provide the maximum filtering effectiveness and to optimize the used amount of water. In fact the two separate filters have a combined filtering surface greater than that of the single filter of a conventional dishwasher, and the smaller area of each sump allows for a greater inclination of the bottom which favours the flowing of the water towards the filter and therefore allows for a greater useful height of the sump.

[0016] The dishwasher door is preferably one but provided with two detergent/rinse aid distributors, one for each sector, so as to introduce the products only in the distributor corresponding to the sector to be used. It is

Fig.1 is a diagrammatic front view showing the essential elements of the present dishwasher and

clear that if the two sectors operate simultaneously according to the same cycle, regardless of the presence of baffle S, the detergent should be divided between the two distributors but this not being the case there is also provided a connection system (described further on) which assures a uniform distribution thereof.

[0017] The dividing baffle S is designed so as to assure along the four sides a sufficient water tightness, but in order to make easier its introduction and removal into and from the tank there is not provided a forced coupling. In fact even possible leakages from one sector to the other in case of separate operation are not a problem, and upon the final drain of the cycle also the drain pump of the inoperative sector is activated for some seconds to drain out said possible leakages.

[0018] Moreover there is also provided a sensor for detecting the presence of baffle S which can be made in various known ways such as a microswitch in a vertical baffle seat, or a magnet mounted on the baffle which activates a reed sensor mounted on the tank or on the door. In this way the microprocessor will not accept the setting of separate cycles in the absence of baffle S and will give a relevant indication to the user, e.g. by lighting up a symbol on the display.

[0019] Referring now to Fig.2, there is illustrated the connection system between the two sectors T, T' which allows to automatically adjust the water level between the two sumps in case of simultaneous operation.

[0020] The element which performs the connection is a four-way manifold C, substantially shaped as a flattened X, which receives water from the wash pumps WP and WP' through respective ducts N, N' in which the flow is controlled by respective valves V, V'. Manifold C also mutually connects the two sumps through respective ducts M, M' for the equalization of the water through the communicating vessels principle.

[0021] It should be noted that ducts M, M' can be separated by a central valve VC, whose opening is controlled by a thermoactuator TA same as valves V, V'. In fact all the valves of manifold C are normally in the closed position, under the action of a spring, and their opening must be ordered by the microprocessor by activating the relevant thermoactuator.

[0022] In the light of the description above, first of all it is clear that the dishwasher can operate in standard mode (with or without baffle S) simply by keeping valve VC open, so as to connect the two sectors, and with valves V, V' which are open during the water load step and the first minutes of the cycle whereas they remain closed in the subsequent steps. It should be noted that the opening of valves V, V' causes the passage in ducts M, M' of pressurized water coming from pumps WP, WP' thus achieving the cleaning of said ducts from possible residues which may settle down when the water flows from one sump to the other during the operating cycle.

[0023] It should also be considered that the microprocessor can take into account possible differences in performance between one sector and the other and car-

ry out slight changes of the cycle in order to "realign" the two sectors. For example, the duration of the activation of resistors H, H' is controlled by respective temperature sensors but it may occur that in one of the two sectors the desired temperature is reached before than in the other sector, due to a different calibration of the sensors, or to a power difference in the resistor or to the type and amount of dishes present in the respective rack or to any combination of these factors. In this instance the microprocessor provides an extension of the activation time of the wash pump of the sector which is "early" in order to obtain thereafter a simultaneous drain.

[0024] The presence of the two resistors H, H' can be advantageous also to achieve short washing cycles since it can be provided to select (e.g. via software) a series connection thereof for normal use, or a parallel connection to double the power and decrease the water heating time.

[0025] On the contrary, if the user sets two different cycles for the two sectors, which can even be started simultaneously, all the valves of manifold C remain closed and the microprocessor controls separately the two cycles. In this instance the user can even start a first cycle in one sector while providing, outside the machine, to the loading of the rack of the other sector which will be used for a second cycle to be started later.

[0026] It is clear that the above-described and illustrated embodiment of the dishwasher according to the invention is just an example susceptible of various modifications. In particular, the number, shape and arrangement of the elements of each sector may be somewhat changed for example by providing additional heating resistors, additional sprinklers, a crockery tray above the rack and so on. Moreover, the single door could be replaced by two individual doors, possibly mutually connectable, so as to make one sector completely independent of the other.

Claims

1. Dishwasher including an electrovalve (W) controlling the entrance of water from the network, a water softening unit, a washing tank, a drain duct (D) and a microprocessor, **characterized in that** in said washing tank there are provided two racks (R, R') side by side and a removable central dividing baffle (S) which performs the division of the tank into two independent sectors (T, T') each of which is provided with a collecting sump with relevant filter from which the water reaches a wash pump (WP; WP') and a drain pump (DP; DP'), a heating resistor (H; H'), a detergent distributor and at least one sprinkler, the feeding of the water coming from said softening unit taking place through a deviating valve (VD) which directs the water to the respective supply ducts of said sectors (T, T') and the draining taking place through a connector (Y) which converges

the drain ducts of the two sectors (T, T') into said drain duct (D), there also being provided a four-way manifold (C) which receives water from said wash pumps (WP; WP') through respective ducts (N, N') in which the flow is controlled by respective valves (V; V'), said manifold (C) also mutually connecting the two sumps through respective ducts (M, M') which are separated by a central valve (VC) of the manifold (C).

2. Dishwasher according to claim 1, **characterized in that** each sector (T, T') includes a top sprinkler (U; U') and a bottom sprinkler (L; L').
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3. Dishwasher according to claim 1 or 2, **characterized in that** all the valves (V, V', VC) of the manifold (C) are normally kept in a closed position by a spring and each of them is driven to opening by a respective thermoactuator (TA) controlled by the micro-processor.
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4. Dishwasher according to one or more of the preceding claims, **characterized in that** the washing tank is closed by a single door provided with two detergent/rinse aid distributors, one at each sector (T, T').
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5. Dishwasher according to one or more of claims 1 to 3, **characterized in that** each sector (T, T') is closed by a relevant door provided with a detergent/rinse aid distributor.
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6. Dishwasher according to claim 5, **characterized in that** the two doors are mutually connectable.
7. Dishwasher according to one or more of the preceding claims, **characterized in that** the dividing baffle (S) is mounted in the tank through a coupling suitable to assure along the four sides an adequate water tightness while allowing for a smooth introduction and removal thereof.
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40
8. Dishwasher according to one or more of the preceding claims, **characterized in that** it includes a sensor for detecting the presence of the dividing baffle (S).
45
9. Dishwasher according to claim 8, **characterized in that** the sensor for detecting the presence of the baffle (S) consists of a magnet mounted on the baffle (S) so as to activate a reed sensor mounted on the tank or on the door.
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10. Dishwasher according to one or more of the preceding claims, **characterized in that** it includes means for selectively connecting the heating resistors (H, H') in series or in parallel.
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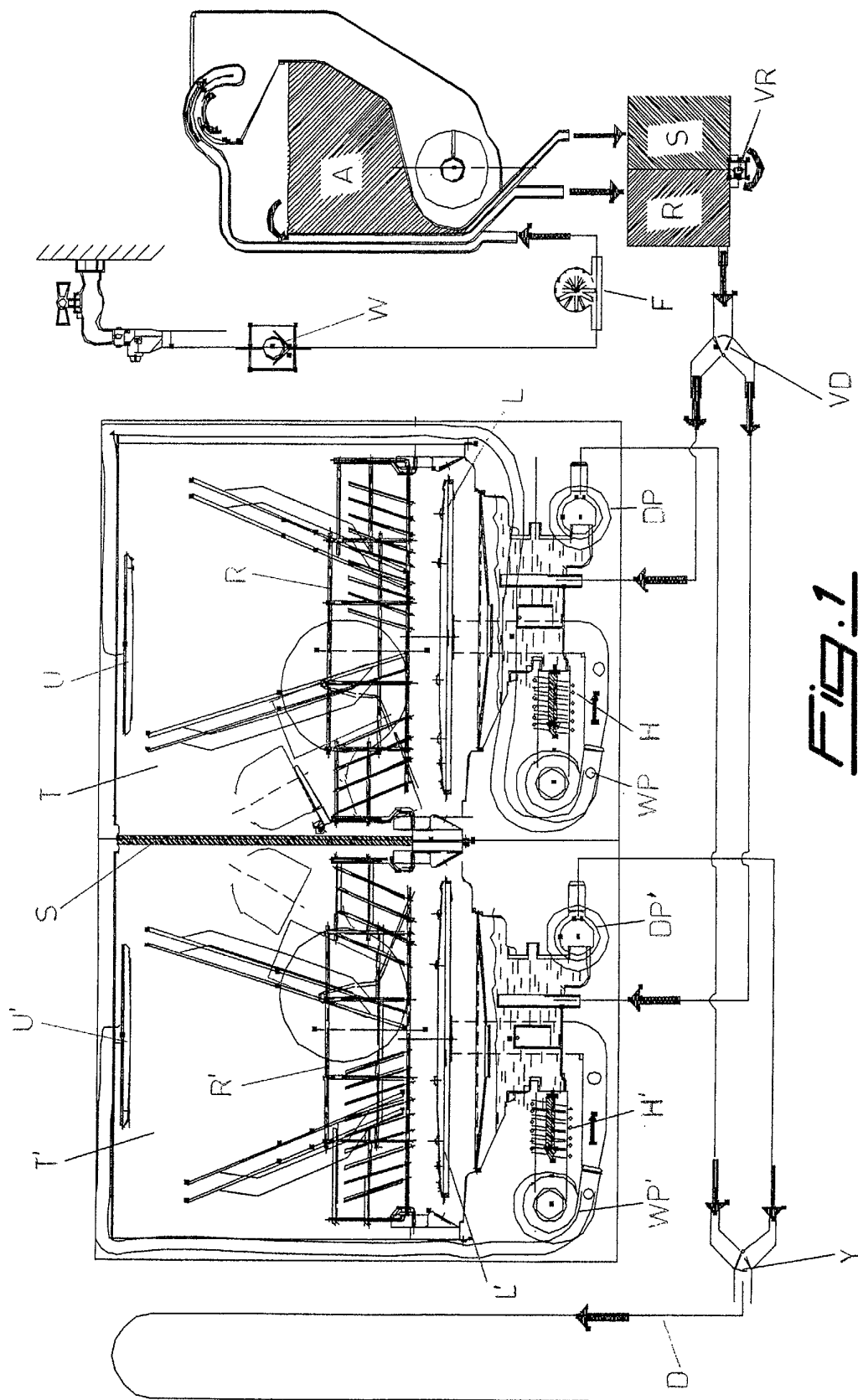
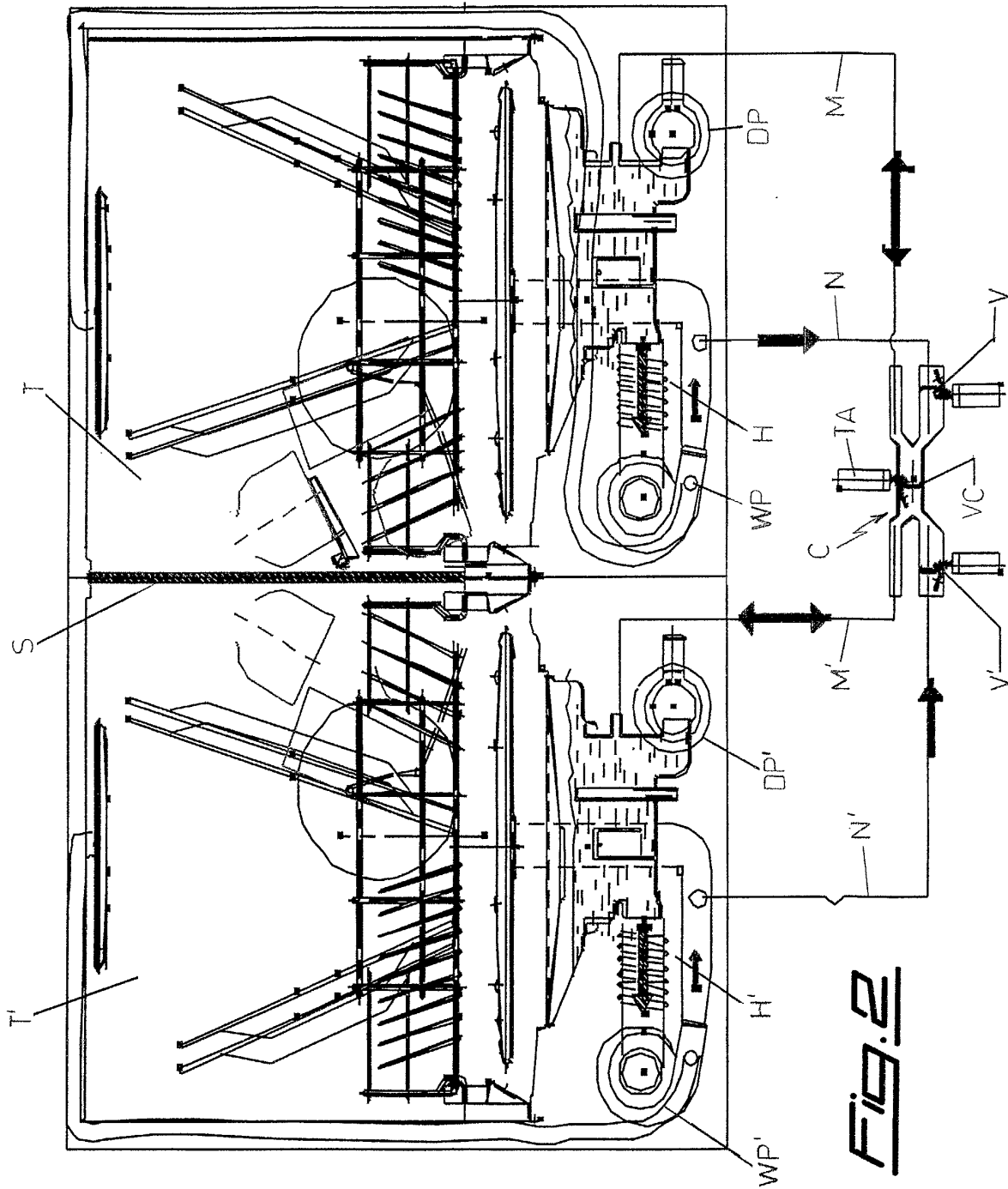


Fig. 1





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Application Number
EP 02 42 5374

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