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(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

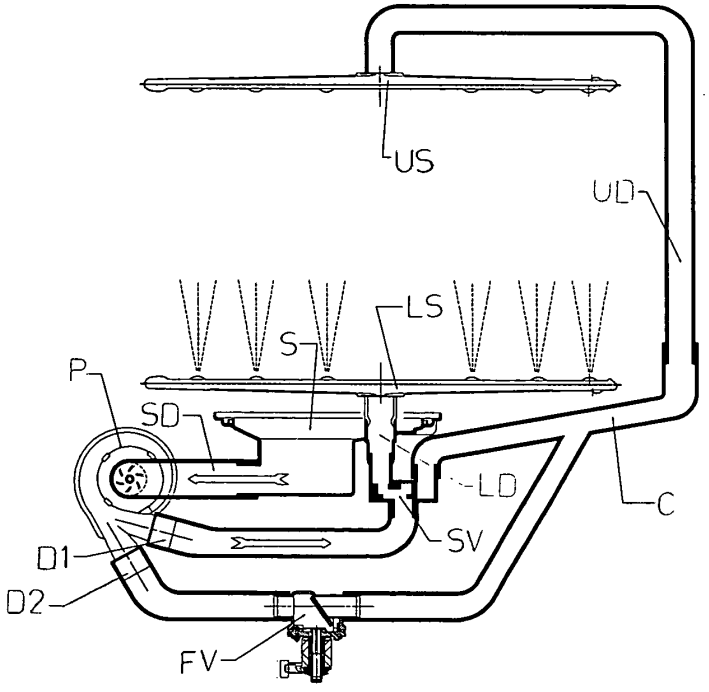
(72) Inventor: **Ambrosi, Andrea**
37052 Casaleone VR (IT)

(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(54) **Dishwasher with improved hydraulic circuit**

(57) A dishwasher includes an upper sprinkler (US) and a lower sprinkler (LS) that receive water through respective delivery ducts (UD, LD), on the bottom of the washing tank there being arranged a collecting sump (S), a suction duct (SD) branching out from the bottom of the latter and leading to a wash pump (P) provided with two deliveries (D1, D2) toward the respective delivery ducts (UD, LD), as well as a valve system suitable to independently control the water flow in the two deliveries (D1, D2), said valve system including at least one two-position slide valve (SV) with a single inlet and two outlets arranged in one of the deliveries (D1), a first outlet of said slide valve (SV) being directly connected to a first delivery duct (LD), whereas the second outlet is connected to the second delivery duct (UD) through a substantially Y-shaped connector (C). In this way the user can choose between alternate wash and simultaneous wash, and the machine has a more efficient, reliable and cheap structure (both to manufacture and to use) with respect to conventional machines in which the hydraulic circuit includes two shut-off valves for controlling the water flow to the sprinklers.

Fig.1



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Description

[0001] The present invention relates to dishwashers, and in particular to a dishwasher provided with a hydraulic circuit that allows the user to choose between the alternate or simultaneous wash on the two racks.

[0002] It is known that in modem dishwashers the user is often offered the possibility of running a "half load", i.e. a wash cycle in which only one of the two sprinklers is used, or an "alternate" wash in which the two sprinklers are alternately supplied with the same amount of water so as to achieve a saving in water and power.

[0003] This type of program is usually obtained through a single-delivery wash pump and a flow distribution valve controlled by the control unit of the machine to direct the water flow to the upper or lower sprinkler. However this conventional arrangement implies the impossibility of being able to wash simultaneously on both racks and this is a strong limitation to the flexibility of use of the machine.

[0004] In fact the alternate wash, in order to assure good wash results, requires long times since washing alternately on a single rack implies almost doubling the times. This increase in length can be tolerated for the "standard" cycle that defines the power saving category of the machine, but is badly tolerated for the other cycles since the market asks for the possibility of choosing between long cycles with low consumption and short cycles with a higher consumption.

[0005] In order to allow the user to choose between the alternate or simultaneous wash on the two racks, the applicant has already devised a dishwasher with two wash pumps each being directly connected to a sprinkler, as disclosed in EP-A-1586265. In this way, it is possible to dispense with the distribution valve to control the supply to the two hydraulic circuits of the two sprinklers, thus achieving a greater efficiency of the hydraulic circuit that has much lower flow resistance thanks to the simplified lay-out.

[0006] However, even this arrangement is not fully satisfactory in that the pumps may have reliability problems caused by the high number of on/off cycles that they must withstand during the machine life. Moreover, since a pump is particularly noisy at start, the alternate operation of the dishwasher results noisier due to the repeated starts of the pumps.

[0007] Another alternative is a dishwasher with a double-delivery pump combined with two shut-off valves that independently control the supply to the two sprinklers in the respective delivery ducts. In this case the main drawback is the difficulty in synchronizing the opening and closing of the two valves in order to prevent, during the alternate operation, a sudden increase in the delivery cross-section that can lead to cavitation of the pump that operates with a reduced amount of water. Moreover, the valves have to be motor-driven to guarantee a sufficient switching speed and this makes them less reliable and particularly expensive, and also the electronic unit controlling them will be expensive.

[0008] Therefore the object of the present invention is to provide a dishwasher that overcomes the above-mentioned drawbacks. This object is achieved by means of a dishwasher having an arrangement similar to the last one mentioned above but in which at least one of the two shut-off valves is replaced by a slide valve with one inlet and two outlets, a first outlet of said slide valve being connected to one of the delivery ducts and the second outlet being in communication with the other delivery duct through a substantially Y-shaped connector.

[0009] The main advantage of the dishwasher according to the present invention is that of achieving the same function of alternate or simultaneous wash through a simpler, cheaper, more reliable and quieter structure with respect to the above-described known arrangements.

[0010] 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 two embodiments thereof, with reference to the annexed drawings wherein:

Fig.1 is a diagrammatic vertical sectional view of a first embodiment of an improved hydraulic circuit for a dishwasher provided with an upper sprinkler and a lower sprinkler, with the valve system set for supplying only the lower sprinkler;

Fig.2 is a view similar to the preceding one, with the valve system set for supplying only the upper sprinkler;

Fig.3 is a view similar to the preceding one, with the valve system set for supplying both sprinklers; and

Figs. 4, 5 and 6 are views respectively similar to Figs. 1, 2 and 3 of a second embodiment of the improved hydraulic circuit.

[0011] With reference to figures 1 to 3, there is seen that a dishwasher conventionally includes an upper sprinkler US and a lower sprinkler LS, that receive water through respective delivery ducts UD, LD. On the bottom of the tank there is arranged a collecting sump S, a suction duct SD branching out from the bottom of the latter and leading to the wash pump P, that is provided with two deliveries D1, D2 in which the valves controlling the supply to the two sprinklers are arranged.

[0012] The novel aspect of the present dishwasher is the presence of a two-position slide valve SV with a single inlet and two outlets in one of the deliveries (D1 in the illustrated example), as well as the presence of a substantially Y-shaped connector C. More specifically, a first outlet of said slide valve SV is directly connected to one of the delivery ducts (LD in the illustrated example), whereas the second outlet is connected through said connector C to the other delivery duct (UD in the illustrated example).

[0013] The flow through the other delivery D2 can be controlled by a conventional flap valve FV, that however does not need to be repeatedly switched because it will normally be closed during the alternate operation that is

achieved by switching the slide valve SV (figs. 1, 2). The opening of the flap valve FV is required only for the simultaneous wash (fig.3), thus preventing the above-mentioned problems of synchronization and dispensing with expensive and unreliable motor-driven valves.

[0014] The second embodiment illustrated in figures 4 to 6 shows how it can be possible to dispense with also this residual shut-off valve by arranging a second two-position slide valve SV' with two inlets and a single outlet at the bifurcation of a similar connector C'. More specifically, a first inlet receives water coming from the first slide valve SV and a second inlet receives water coming from the second delivery D2, while the outlet is connected to the upper delivery duct UD.

[0015] In this way, the flow through delivery D2 is free but the access to connector C' is controlled by the second slide valve SV' that acts as a shut-off valve when it keeps closed the inlet to which delivery D2 is connected. Similarly to the first embodiment, this second slide valve SV' does not need to be repeatedly switched because it will normally be inoperative during the alternate wash, that is achieved by switching the first slide valve SV (figs.4, 5). The activation of the second slide valve SV' is required only for the simultaneous wash (fig.6).

[0016] It is therefore clear how these arrangements allow to combine the two different washing modes, simultaneous and alternate, while achieving high wash performance with a flexibility in cycle composition, a quietness and a reliability that can not be obtained with present machines.

[0017] It is clear that the above-described and illustrated embodiments of the dishwasher according to the invention are just examples susceptible of various modifications. In particular, size and shape of the various connecting ducts D1, D2, SD, LD, UD can be changed according to specific needs, and the positions of the valves SV, SV', FV can be swapped between the two deliveries D1, D2. In other words, it can be the delivery duct LD that receives water from both deliveries D1, D2 rather than the delivery duct UD as illustrated above.

Claims

1. A dishwasher including an upper sprinkler (US) and a lower sprinkler (LS) that receive water through respective delivery ducts (UD, LD), on the bottom of the washing tank there being arranged a collecting sump (S), a suction duct (SD) branching out from the bottom of the latter and leading to a wash pump (P) provided with two deliveries (D1, D2) toward said respective delivery ducts (UD, LD), as well as a valve system suitable to independently control the water flow in said two deliveries (D1, D2), **characterized in that** said valve system includes at least one two-position slide valve (SV) with a single inlet and two outlets arranged in one of said two deliveries (D1, D2), a first outlet of said slide valve (SV) being directly connected to a first delivery duct (UD, LD), whereas the second outlet is connected to the second delivery duct (UD, LD) through a substantially Y-shaped connector (C; C') connected to the other of said two deliveries (D1, D2).

2. A dishwasher according to claim 1, **characterized in that** it further includes a second two-position slide valve (SV') with two inlets and a single outlet arranged at the bifurcation of the substantially Y-shaped connector (C'), a first inlet of said second slide valve (SV') receiving water coming from the first slide valve (SV) and a second inlet receiving water coming from the second delivery (D1, D2).

3. A dishwasher according to claim 1, **characterized in that** the flow through the second delivery (D1, D2) is controlled by a flap valve (FV) that is normally closed during the alternate wash.

Fig.1

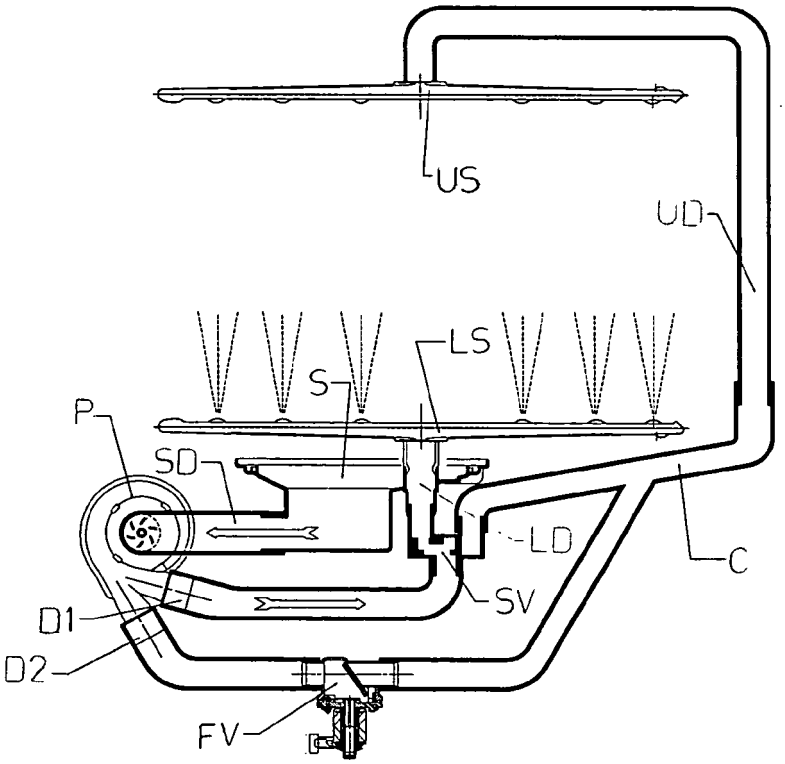


Fig.2

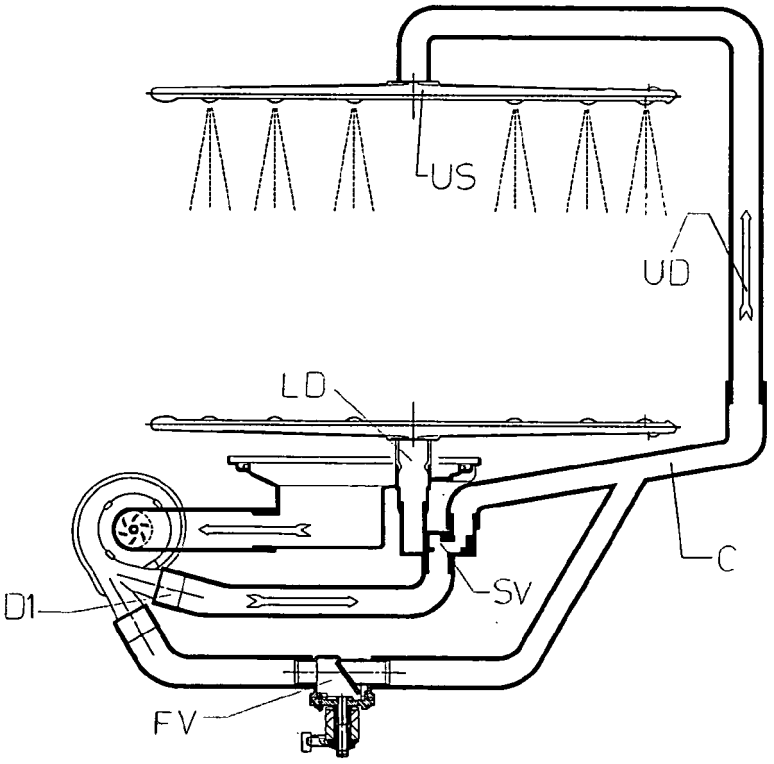


Fig.3

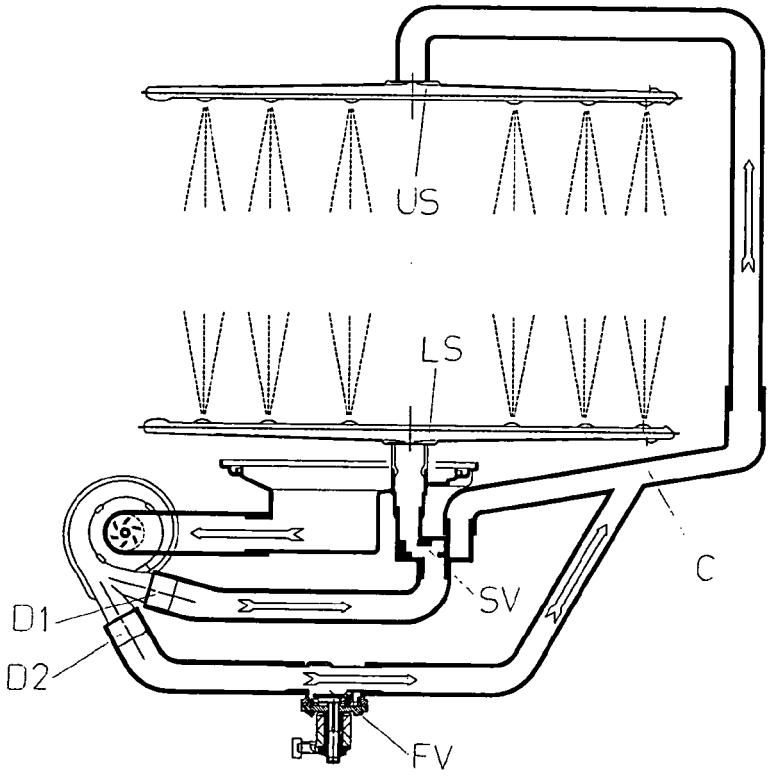


Fig.4

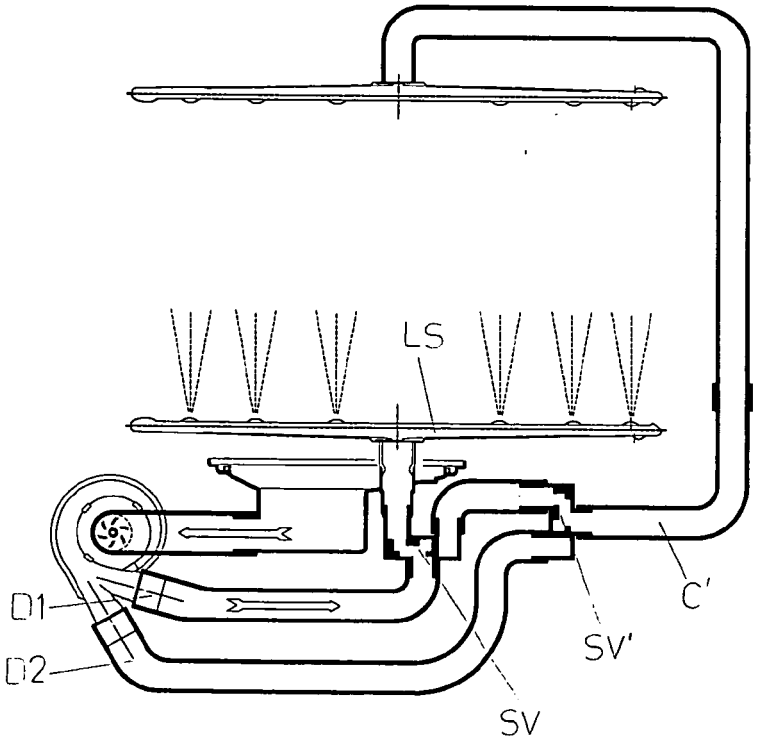


Fig.5

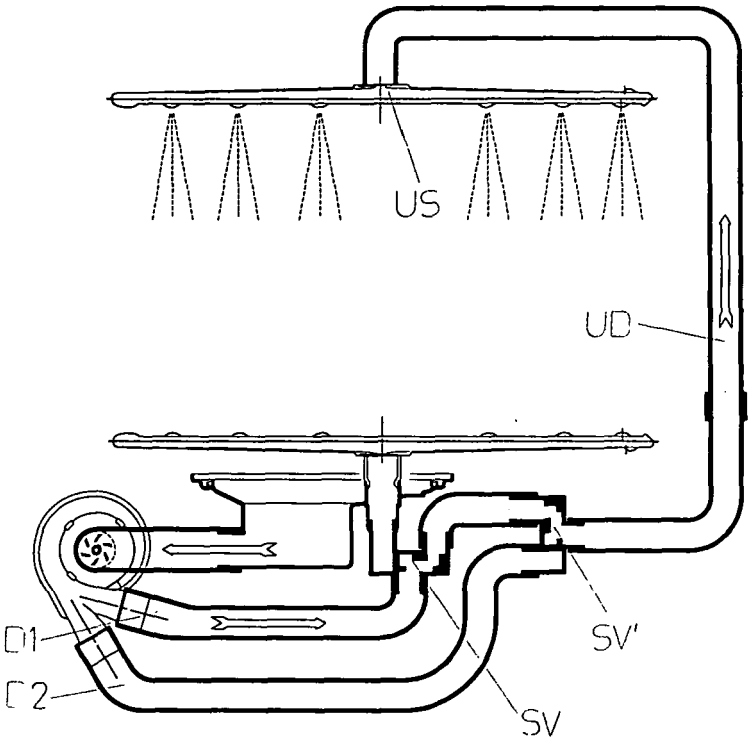
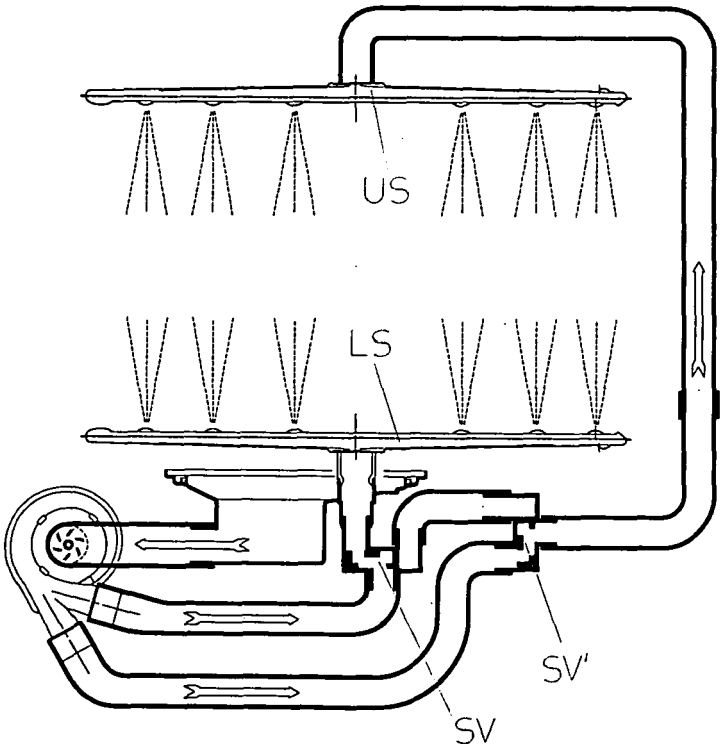


Fig.6



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EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5044

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 July 2006	Martin Gonzalez, G

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

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