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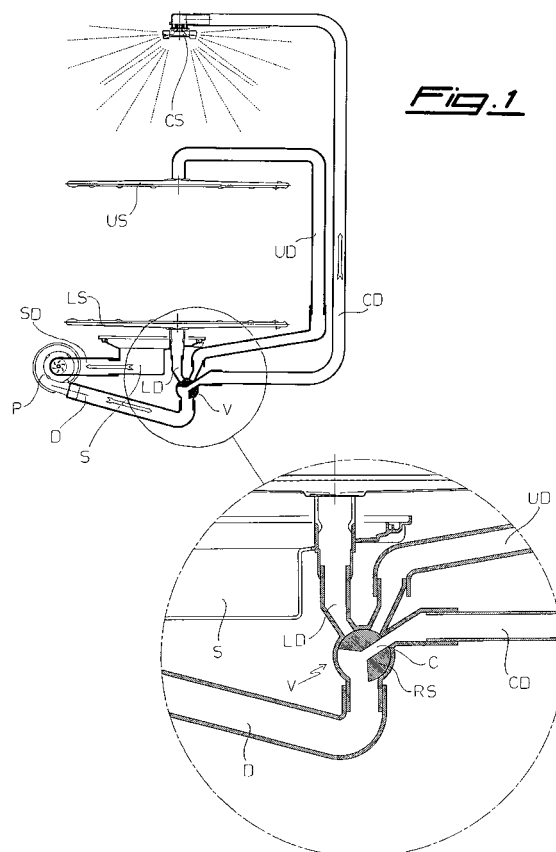
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(54) **Dishwasher with improved hydraulic circuit**

(57) A dishwasher includes an upper sprinkler (US), a lower sprinkler (LS) and a ceiling sprinkler (CS) that receive water through respective delivery ducts (UD, LD, CD), 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 a delivery (D) in which there is arranged a three-way valve (V) with a single inlet and three outlets, that includes a rotating shutter (RS) suitable to be alternately aligned with one of the three outlets while shutting the other two, the three delivery ducts (UD, LD, CD) being each connected to one of these three outlets. In this way it is possible to achieve the same function of alternate wash combined with the ceiling sprinkler (CS) without having to increase the water load, and therefore without any increase in water and power consumption, as well as in noise; moreover, the ceiling sprinkler (CS) can have a flow rate equal to that of the rack sprinklers (US, LS), whereby the washing effectiveness is increased.



Description

[0001] The present invention relates to dishwashers, and in particular to a dishwasher provided with a hydraulic circuit that allows to supply a sprinkler located on the tank ceiling separately from the sprinklers that wash the dishes arranged on the two racks. Specific reference will be made hereafter to the typical arrangement with two stacked racks, with corresponding upper and lower sprinklers, and a single ceiling sprinkler while it is clear that what is being said also applies to horizontal dishwashers with two side-by-side racks that may have also two ceiling sprinklers with a common supply.

[0002] It is known that in modern 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 two-way flow distribution valve controlled by the control unit of the machine to direct the water flow to the upper or lower sprinkler.

[0004] In high performance dishwashers there is also provided a third smaller sprinkler applied on the top portion or ceiling of the tank. The hydraulic connection to this third sprinkler is achieved by connecting it directly to the wash pump or as a branch-off from the supply duct of one of the two sprinklers, typically the upper sprinkler.

[0005] In both cases this conventional arrangement implies that the ceiling sprinkler operates simultaneously with one of the two rack sprinklers, but this involves loading a greater amount of water with respect to the water load required to supply only one of the two rack sprinklers, in order to prevent cavitation of the pump.

[0006] This results in higher consumptions of water and power to heat said water, as well as in an increased noise due to the greater amount of water falling down on the tank bottom.

[0007] Therefore the object of the present invention is to provide a dishwasher that overcomes said drawbacks. This object is achieved by means of a dishwasher whose sprinkler supply circuit includes a three-way distribution valve suitable to direct the water flow to any of the above-mentioned sprinklers individually.

[0008] The main advantage of the dishwasher according to the present invention is that of achieving the same function of alternate wash combined with the ceiling sprinkler without having to increase the water load, and therefore without any increase in water and power consumption, as well as in noise.

[0009] A second significant advantage of this dishwasher stems from the possibility of using a larger ceiling sprinkler having a flow rate equal to that of the rack sprinklers, since it is individually supplied with the same amount of water, whereby the washing effectiveness is increased.

[0010] Still another advantage of said dishwasher is

the possibility of individually operating the ceiling sprinkler at the moments when this is most advantageous, such as for example at the end of the wash step and at the end of the rinse to wash away from the dishes the last residues.

[0011] 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:

Fig.1 is a diagrammatic vertical sectional view, with an enlarged detail, of the improved hydraulic circuit for a dishwasher provided with stacked racks, with the valve system set for supplying only the ceiling sprinkler;

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

Fig.3 is a view similar to the preceding one, with the valve system set for supplying only the lower sprinkler.

[0012] With reference to said figures, there is seen that a dishwasher conventionally includes an upper sprinkler US, a lower sprinkler LS and a ceiling sprinkler CS that receive water through respective delivery ducts UD, LD and CD. 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 supplies water to the sprinklers through a delivery D in which the valve controlling the supply to the sprinklers is arranged.

[0013] The novel aspect of the present dishwasher is the presence of a three-way valve V with a single inlet and three outlets, the three delivery ducts UD, LD and CD being each connected to one of these three outlets. More specifically, valve V includes a rotating shutter RS, provided with a through channel C, suitable to be alternately aligned with one of the three outlets while shutting the other two.

[0014] In particular, in fig.1 valve V is set to supply the ceiling sprinkler CS through the relevant duct CD, that in the illustrated preferred embodiment has the same size as the other two delivery ducts UD, LD. Similarly, in fig. 2, valve V is set to supply the upper sprinkler US through the relevant duct UD, and in fig.3 valve V is set to supply the lower sprinkler LS through the relevant duct LD.

[0015] 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, size and shape of the various connecting ducts D, SD, LD, UD, CD can be changed according to specific needs, and the position of valve V can be changed as long as it controls the individual supply to the three sprinklers.

[0016] Furthermore, the three-way valve V can be made in other equivalent ways, for example as a slide

valve with a translating shutter instead of the rotating shutter RS or as two two-way valves connected in series.

Claims

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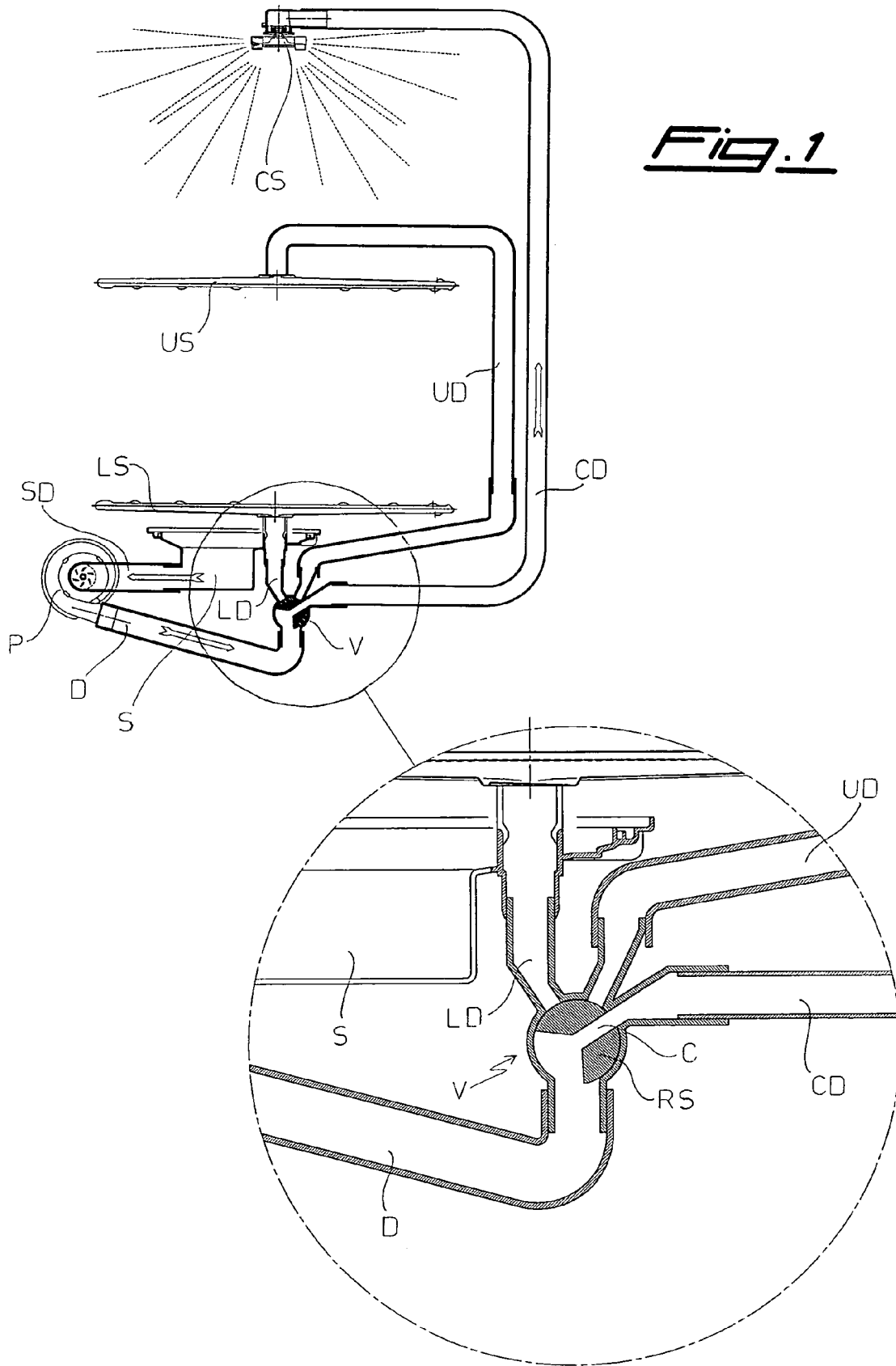
1. A dishwasher including an upper sprinkler (US), a lower sprinkler (LS) and a ceiling sprinkler (CS) that receive water through respective delivery ducts (UD, LD, CD), on the bottom of the washing tank there being arranged a collecting sump (S), a suction duct (SD) branching out from the bottom of the latter and leading to a wash pump (P) provided with a delivery (D) toward said respective delivery ducts (UD, LD, CD), as well as a valve system suitable to control the water flow toward the delivery ducts (UD, LD, CD), **characterized in that** said valve system is suitable to individually supply any one of said sprinklers (US, LS, CS) while shutting off the supply to the other two sprinklers. 10 15 20
2. A dishwasher according to claim 1, **characterized in that** the valve system includes a three-way valve (V) with a single inlet and three outlets, the three delivery ducts (UD, LD, CD) being each connected to one of these three outlets. 25
3. A dishwasher according to claim 2, **characterized in that** the three-way valve (V) includes a rotating shutter (RS), provided with a through channel (C), suitable to be alternately aligned with one of the three outlets while shutting the other two. 30
4. A dishwasher according to one of the preceding claims, **characterized in that** the delivery duct (CD) of the ceiling sprinkler (CS) has the same size of the delivery ducts (UD, LD) of the other two sprinklers (US, LS). 35

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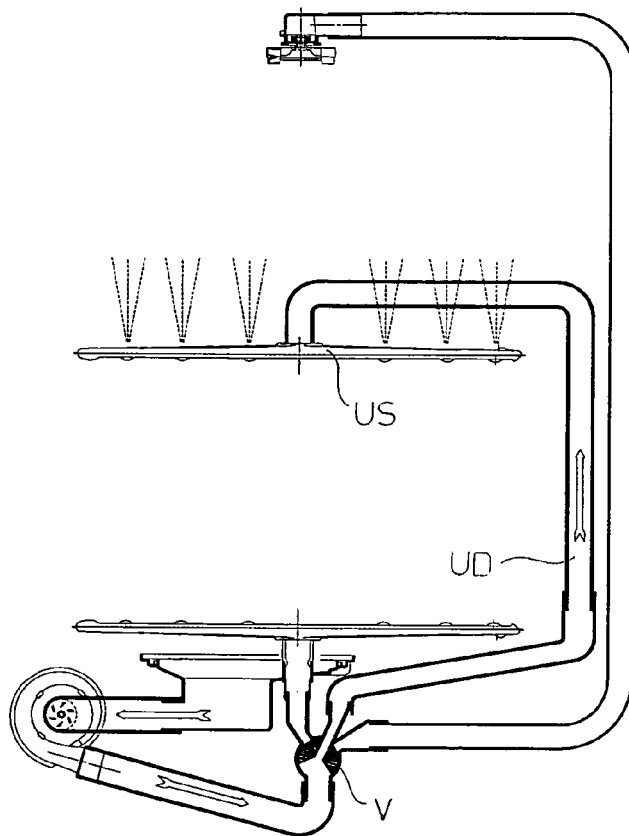
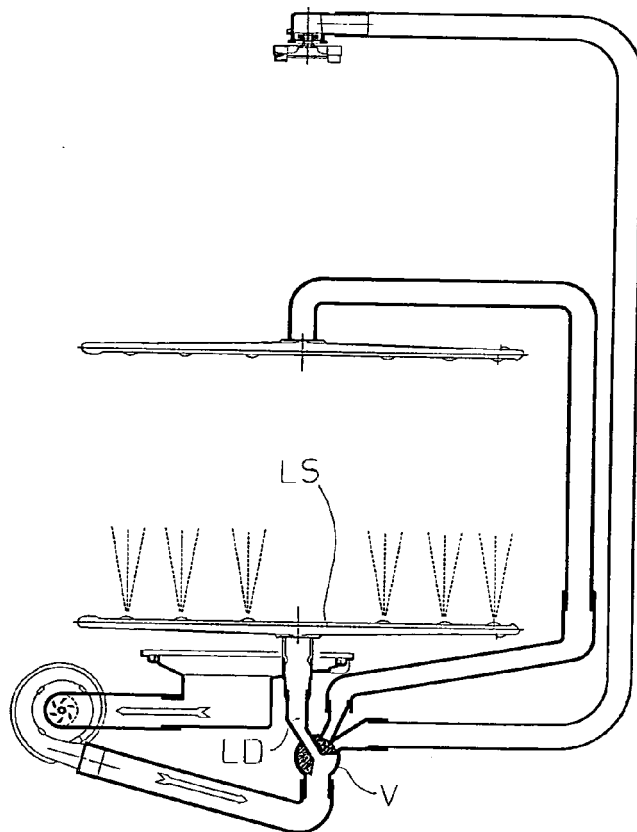


Fig. 2

Fig. 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5575

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 101 33 129 A1 (MIELE & CIE [DE]) 16 January 2003 (2003-01-16)	1-3	INV. A47L15/42 A47L15/23
A	* paragraphs [0013], [0014], [0016]; claims 1,2; figures 2,3 *	4	
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A	* claims 1,2; figures *	4	
X	EP 1 123 684 A2 (BONFERRARO S P A [IT]) 16 August 2001 (2001-08-16)	1	
A	* paragraphs [0006], [0012]; claim 1; figure 1 *	4	
X	EP 0 383 028 A2 (LICENTIA GMBH [DE]) 22 August 1990 (1990-08-22)	1-3	TECHNICAL FIELDS SEARCHED (IPC) A47L
A	* column 1, line 6 - line 13 * * column 2, line 23 - line 44; figure 1 *	4	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 January 2007	Examiner Courrier, Gilles
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 42 5575

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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