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(71) Applicant: **SMEG S.p.A.**
I-42016 Guastalla (IT)

(72) Inventor: **Bertazzoni, Roberto**
42016 Guastalla (RE) (IT)

(74) Representative: **Adorno, Silvano et al**
c/o SOCIETA' ITALIANA BREVETTI S.p.A.
Via Carducci, 8
20123 Milano (IT)

(54) Hydraulic connection device for a dishwasher rack which can be positioned at two different heights

(57) A hydraulic connection device for a dishwasher rack which can be positioned at two different heights comprises a sprinkler feed duct (1), integral with the rack and extending upto the outlet (2) of the supply pipe provided with a nozzle (3). Said duct (1) has at its end a chamber (1a) of gradually increasing section which is divided into an upper inlet (7a) and a lower inlet (7b), capable of alternately being the seat wherein said nozzle (3) is tight-inserted. The passage between said chamber (1a) and each inlet (7a, 7b) is usually shut by an upper vane (5a) and a lower vane (5b), respectively, capable of opening under the action of the water flow coming from the outlet (2) as well as under the mechanical action exerted by the nozzle (3), while the other vane, not connected to the nozzle (3), remains closed. The lower vane (5b) is connected along its lower end to the edge of the chamber (1a), capable of rotating with respect thereto thanks to its flexibility.

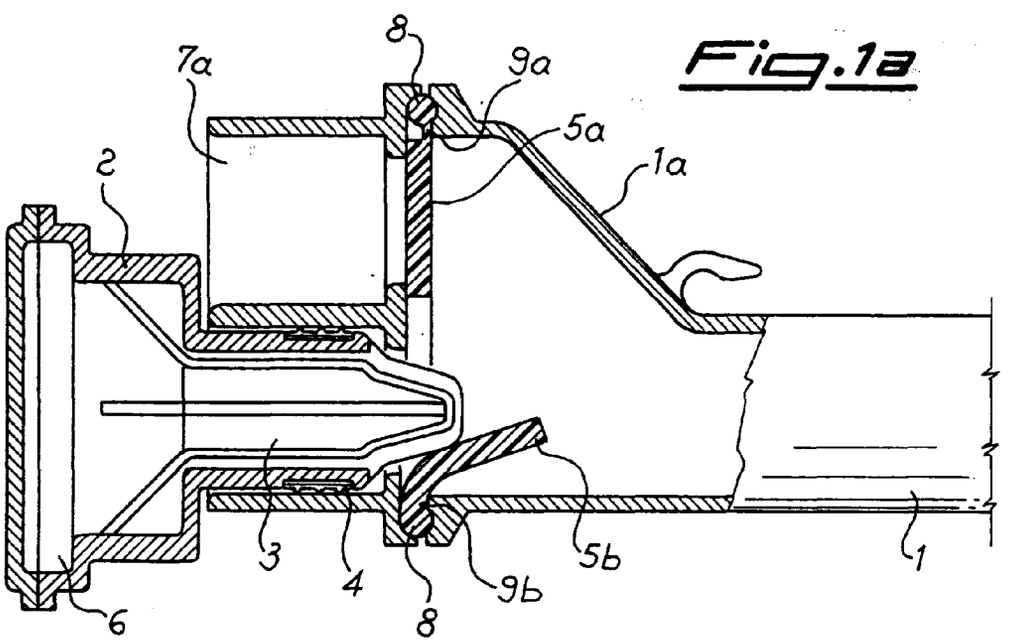

Fig.1a

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Description

The present invention relates to dishwashers having the upper rack which can be positioned at two different heights, and in particular to a hydraulic connection device for such type of rack.

Some dishwashers are known to provide the possibility of adjusting the height of the upper rack, usually by choosing between two positions, so as to achieve a greater flexibility in the exploitation of the overall height of the washing tank. This does not involve any difficulty in the case of the upper rack sprinkler being attached to the tank ceiling, or under the rack but fed from the ceiling with the supply flow which falls downward in open air. However, in the most common case of the sprinkler being fed through a duct extending up to the rear wall of the tank, there is the problem of maintaining the hydraulic connection of the sprinkler integral with the rack when the latter is shifted from one position to the other.

A first solution is having a double outlet at the end of the supply pipe extending from the pump to the upper sprinkler, and keeping closed the outlet not in use depending on the rack position. This can be achieved by providing on each outlet of the supply pipe a shutter which remains closed if said outlet is not in use, e.g. by means of an internal spring. When an axial pin projecting from the feed duct of the upper rack sprinkler is inserted into an outlet, said pin causes the opening of the corresponding shutter by overcoming the spring resistance. As an alternative, the sprinkler feed duct may carry a pair of end shutters integral therewith, one above and one below. In this way, when an outlet is connected to the feed duct the other outlet is closed by the corresponding upper or lower shutter by pushing the rack up to the rear wall of the tank.

Both these devices have a first drawback of greater dimensions and manufacturing complexity due to the need of providing a double outlet in the rear wall of the tank. A second drawback is the higher flow resistance caused by the presence of the second outlet not in use, where there is a stagnation and/or a recirculation of the water arriving at the top of the supply pipe. Another drawback of the internal spring shutter is that the spring is critical for a proper working thereof without leaks from the outlet not in use, whereby the device will be ineffective if the spring moves around or bends. Moreover, in the case of the rack-carried shutters there is no effective tightness if the rack is not pushed well back to the rear wall, which can also occur due to the vibrations during the dishwasher operation.

A second solution is forming a single outlet in the tank, as in conventional dishwashers, and providing the end of the sprinkler feed duct with a wide water-collecting cap. Such a cap is high enough to enclose the outlet of the supply pipe in both the possible rack positions, and the tightness is achieved by having the cap abut against the rear wall of the tank.

Also this solution has the drawback of a significant flow resistance caused by the recirculation of water within the wide cap prior to the entrance into the feed duct. Furthermore, also in this case there is the problem of the tightness depending upon the correct positioning of the rack.

Other solutions trying to overcome the drawback of the flow resistance are based on the use of shutters with a ball movable under the action of the water flow for closing either inlet, which however could have tightness problems, or shutters of the type with a single or double hinged vane. When there is a single vane, it is hinged in a middle position between the two water inlets, and, in order that it does not rotate through an excessive angle, a great narrowing of the passage section is necessary, resulting in a flow resistance. When there is a vane for each inlet, the lower one is hinged along its upper side, at the level of the middle area between the two inlets, in order to exploit the gravity for the closing.

While the upper vane has no problem during the rotation (anyhow limited by the adjacent wall of the collector chamber) due to the elastic deformation of a thickness which is smaller than the peripheral gasket integral therewith, there are difficulties for the lower vane. In fact, the rotation of the latter, being free to rotate even through 180°, involves the rotation of the entire vane connection edge, consisting of a thin rubber strip between two gasket sides, owing to the little available space. In time, due to the little solidity of the concerned thicknesses and to the composite flexotorsional deformation of the connection edge, the vane support may break, resulting in the vane detachment.

The object of the present invention is thus to provide a hydraulic connection device for the upper rack overcoming the above-mentioned drawbacks of prior art devices, and in particular avoiding the problems of physical integrity of the shutting system.

Such an object is achieved by means of a device having the characteristics recited in claim 1.

A first main advantage of the device according to the present invention is its structural simplicity, which ensures a cheap manufacturing and a reliable working.

A second advantage of the present device stems from the fact that the tightness is ensured by the pressure of the water flow itself, acting so as to close the vane not in use, even the lower one, thus making up for its possible incomplete return due to residual plastic deformation.

These and other advantages and characteristics of the device 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 attached drawings wherein:

Fig. 1a is a diagrammatic vertical cross-sectional view of a preferred embodiment of the device, with the rack placed in the upper position, and

Fig. 1b is a diagrammatic vertical cross-sectional view of the same embodiment of the device, with

the rack placed in the lower position.

Referring to the drawings, there is seen that the device according to the invention essentially comprises an upper rack feed duct 1, having its rear end gradually widening so as to form a chamber la of increasing section, which has an upper inlet 7a and a lower inlet 7b, identical to each other. Each of said inlets 7a, 7b has a vane shutter 5a, 5b, usually closed and capable of allowing the water flow only in the direction towards duct 1. Inlets 7a, 7b are sized and shaped so as to fit externally on outlet 2 of supply pipe 6, which ends in a projecting nozzle 3 towards the inside of the washing tank 9. A gasket 4 ensures the tightness between nozzle 3 and either inlet 7a, 7b.

According to the present invention, while the upper vane 5a is hinged in a known manner along its upper side to gasket 8, which encircles the inlet of chamber la, through an area 9a having a substantially reduced thickness which ensures the rotation thanks to its elastic deformation, the lower vane 5b is connected to gasket 8 along its lower side so as to usually keep a vertical position. This is achieved by providing a significant thickness for the whole vane 5b, with a preferential bending area 9b having a thickness only slightly smaller than gasket 8 and the remaining portion of the vane.

The opening of lower vane 5b is thus relied on the mechanical deformation due to the inlet of nozzle 3 and to the pressure of the water flow. A slight reduction of the thickness in area 9b is anyhow preferable, though it must be little in order to prevent any possible breaking and to allow a nearly complete elastic return when duct 1 is in the lower position (Figure 1b). It should be noted that the possible residual plastic deformation (magnified in the phantom position in Figure 1b) is anyhow eliminated by the pressure of the water entering from 7a, thus ensuring the tightness.

It is evident that the closing mechanism of the inlet not in use is completely automatic and free from tightness problems. Furthermore, the water flow is subjected to a very low flow resistance since it does not directly flow into any stagnation point.

It is clear that the above-described and illustrated embodiment of the device according to the invention is just an example liable to various modifications. In particular, the shape and size of chamber la and inlets 7a, 7b may be freely changed according to the needs

Claims

1. A hydraulic connection device for a dishwater rack which can be positioned at two different heights, comprising a sprinkler feed duct (1), integral with said rack and extending upto the outlet (2) of the supply pipe (6), which ends in a nozzle (3), said duct (1) having at its end a chamber (la) of gradually increasing section which is divided into an upper inlet (7a) and a lower inlet (7b) suitable of alternately being the seat wherein said nozzle (3) is tight-inserted, a vane shutter (5a, 5b) being provided inside said chamber (la) respectively at the level of each of said inlets (7a, 7b), the upper vane (5a) being hinged at the top to a peripheral gasket (8) through an area (9a) with a reduced thickness, characterized in that the lower vane (5b) is connected to said gasket (8) along its lower side and is capable of remaining usually in a closed vertical position and of being opened under the mechanical action of the nozzle inserted in the lower inlet (7b) and of the pressure of the water flow coming from the outlet (2).

2. A device according to claim 1, characterized in that said lower vane (5b) is integral with said gasket (8) and has in proximity thereto a preferential bending area (9b) whose thickness is slightly smaller than the thickness of the vane or of the gasket.

3. A device according to claim 1 or 2, characterized in that said nozzle (3) protrudes from said outlet (2) for a length greater than the length of said inlets (7a, 7b) upto the vertical position of the two vanes (5a, 5b).

4. A device according to claim 3, wherein said nozzle (3) is externally provided with a gasket (4) in its protruding length for the tight coupling with either inlet (7a, 7b) in which it is alternately inserted.

5. A device according to any of the previous claims, wherein the return of the lower vane (5b) to the vertical position of tight-closing is ensured, in spite of a possible residual plastic deformation, by the pressure of the water flowing in the chamber (1a) from the upper inlet (7a).

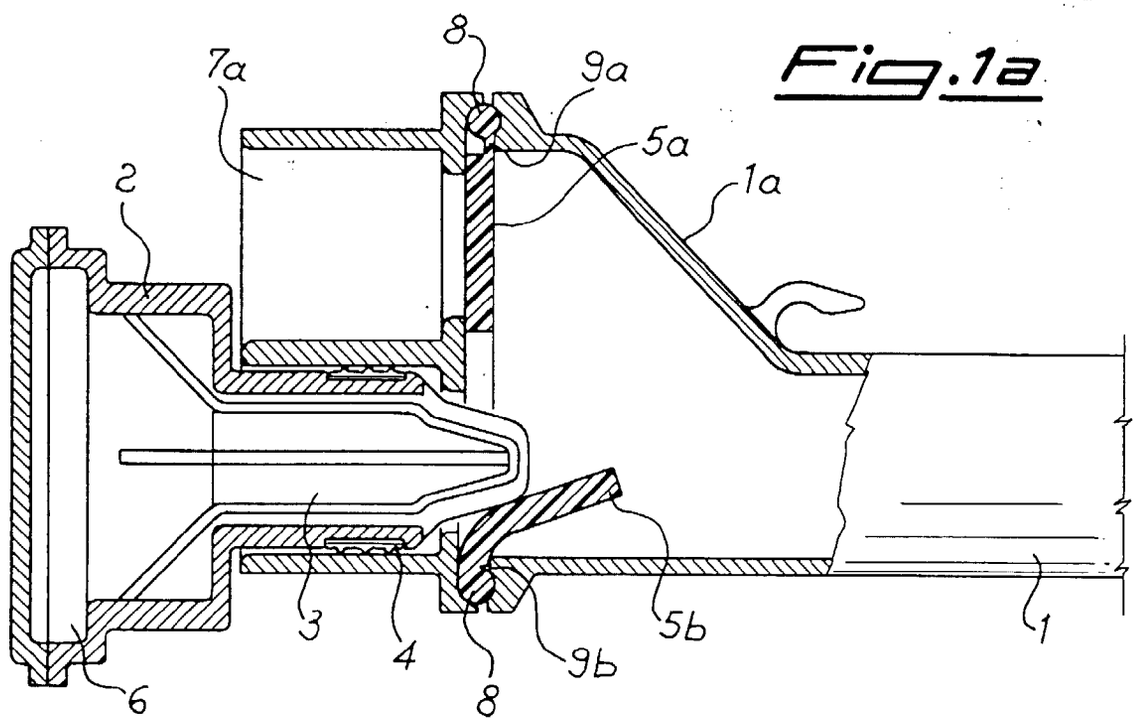

Fig.1a

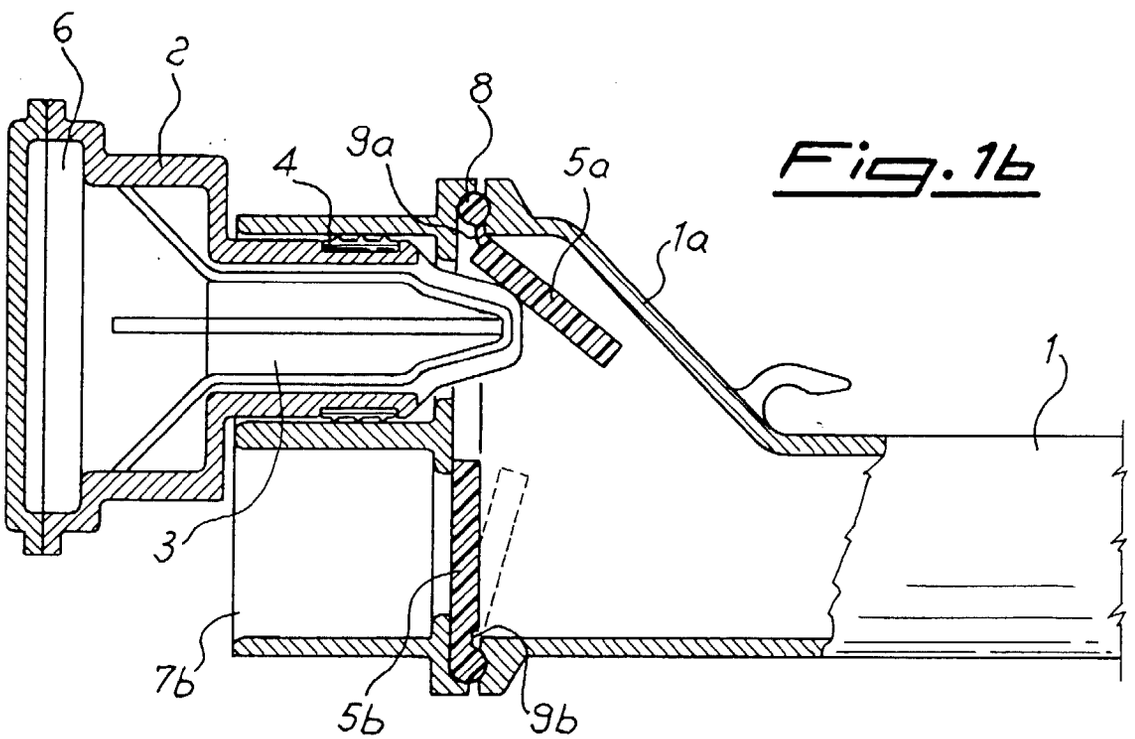

Fig.1b

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EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0134

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 401 767 A (INDUSTRIE ZANUSSI S.P.A.) 12 December 1990 * claims; figures *	1	A47L15/50 A47L15/23
A	FR 2 508 789 A (AKTIEBOLAGET ELECTROLUX) 7 January 1983 * the whole document *	1	
A	WO 83 01892 A (AKTIEBOLAGET ELECTROLUX) 9 June 1983 * claims; figures *	1	
P,A	EP 0 786 231 A (SMEG S.P.A.) 30 July 1997 * column 3, line 38 - column 4, line 2; figures 5,6 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 June 1998	Courrier, G

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