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(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)

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

alternately being the seat wherein said nozzle (3) is tight-inserted. A check valve (5a, 5b) is provided inside said chamber (1a) at each of said inlets (7a, 7b), capable of opening under the action of the water flow coming from the outlet (2), the other check valve, not connected to the nozzle (3), being closed. The resulting device is simple, cheap, reliable and free from problems of tightness or high flow resistance.

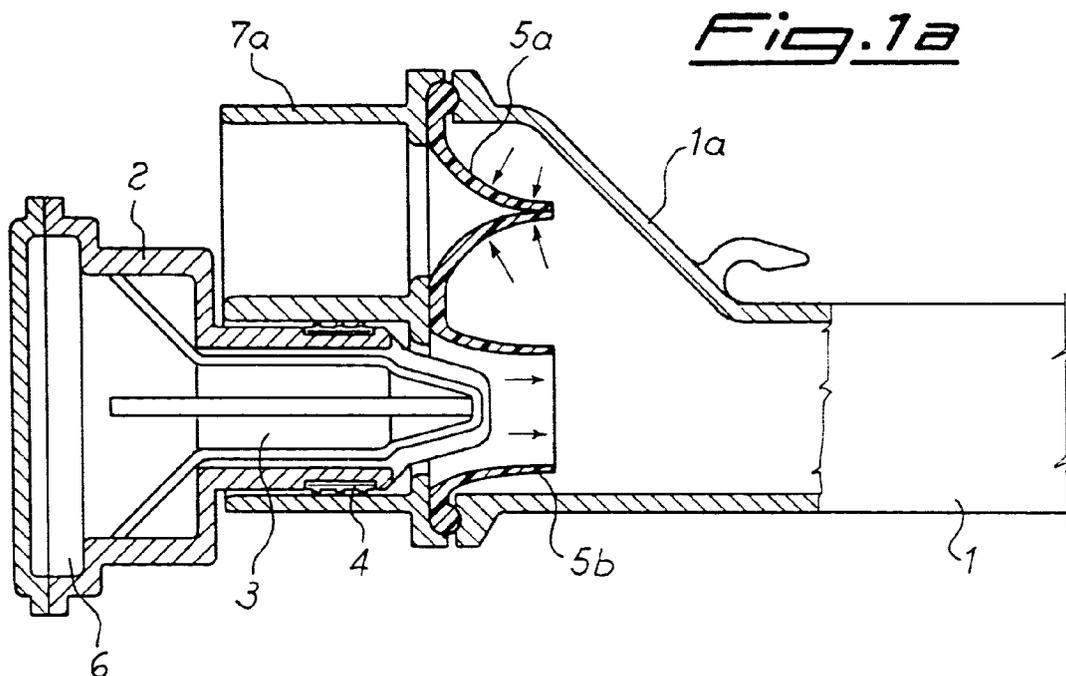


Fig. 1a

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.

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.

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 valve not in use.

Still another advantage of the present device is the reduced flow resistance even in the case of an imperfect tightness of the closed valve.

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 sprinkler feed duct 1, having its rear end gradually widening so as to form a chamber 1a 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 check valve 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 the supply pipe 6, which ends in a nozzle 3 projecting towards the inside of the washing tank 9. A gasket 4 ensures the tightness between nozzle 3 and either inlet 7a, 7b.

As shown in fig. 1a, when the rack is placed in the upper position, the connection between the supply pipe 6 and the feed duct 1 is performed through the lower inlet 7b. The mechanical action of nozzle 3 inserted therein and the pressure of the water now coming from the nozzle result in the opening of the lower check valve 5b, while the water pressure in chamber 1a acts in the direction of the arrows in the drawing so as to press against upper check valve 5a and keep it closed. When the rack is shifted to the lower position, as in fig. 1b, the connection is performed through the upper inlet 7a and

valve 5a in the same way as described above.

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.

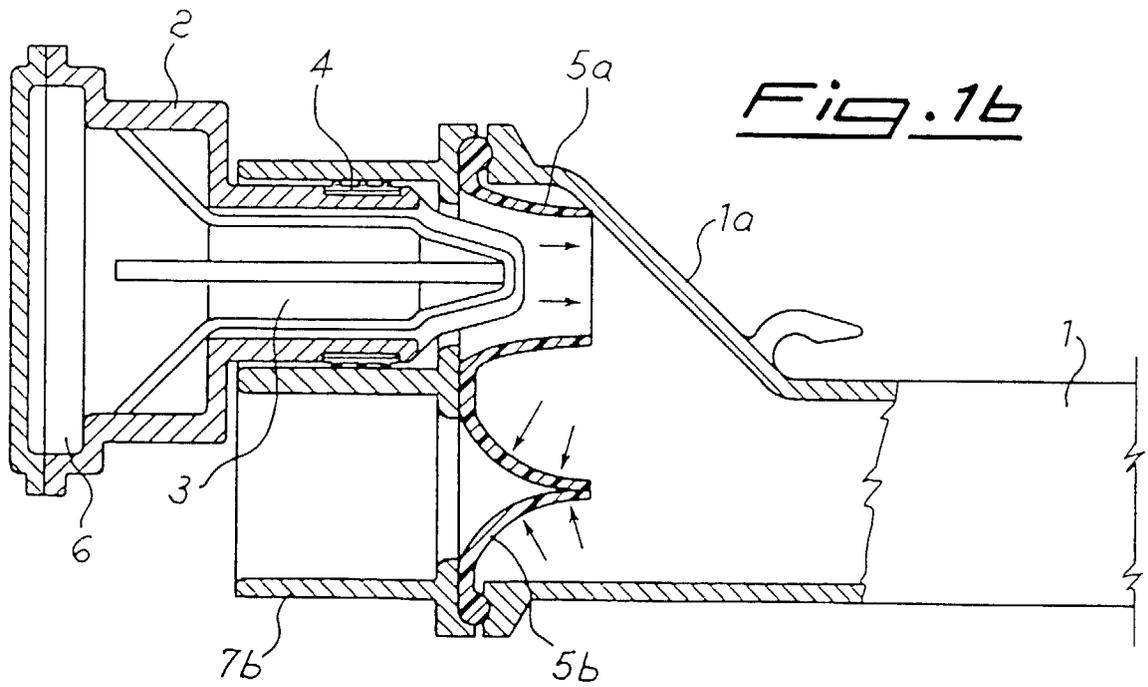
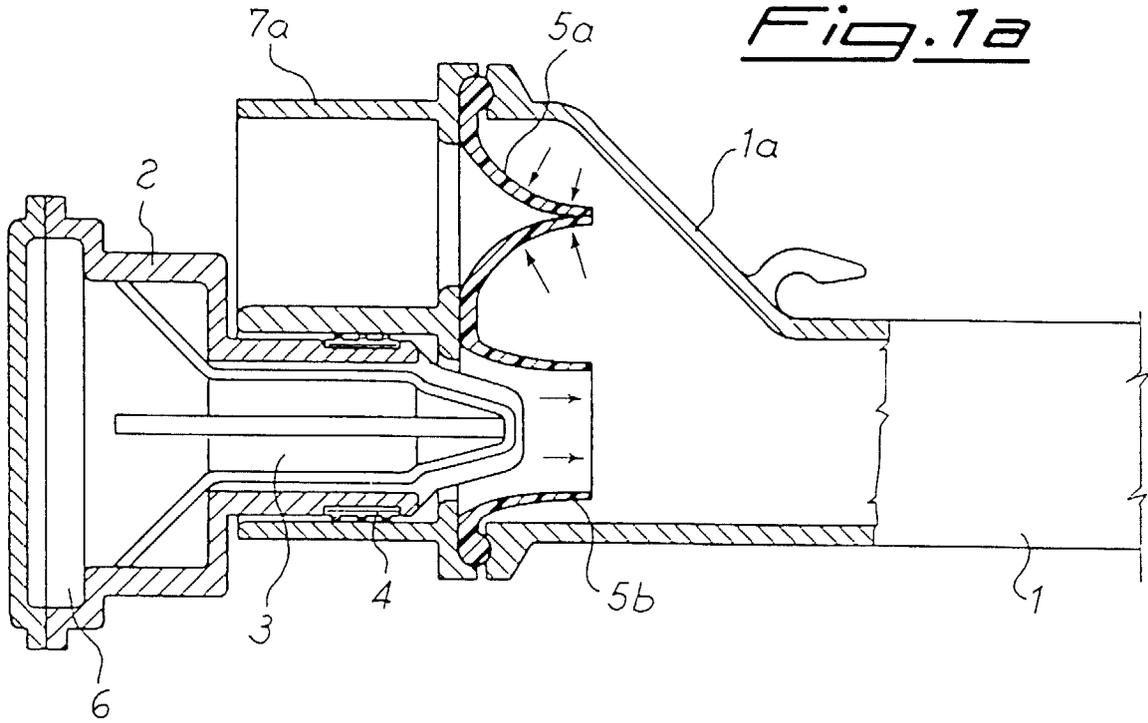
It should be noted that any check valve may be used, but simple "lip" valves made of a flexible material such as rubber, which are depicted in the drawing, are especially preferred. Though they can not ensure an absolute tightness in closing, possible refluxes of maximum 2-3% are quite acceptable, also considering that the water thus reflowing would anyhow fall into the tank through the inlet not in use.

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 1a and inlets 7a, 7b may be freely changed according to the needs. Furthermore, the two check valves may be made in another way than the depicted type of flexible lip valves, as long as they are automatically operated by nozzle 3 and by the entering water flow.

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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), characterized in that said outlet (2) ends in a nozzle (3) and 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) suitable of alternately being the seat wherein said nozzle (3) is tight-inserted a check valve (5a, 5b) being provided inside said chamber (1a) and at each of said inlets (7a, 7b) which valve is capable of opening under the mechanical action of the nozzle inserted in the respective inlet (7a, 7b) and of the pressure of the water flow coming from the outlet (2), which helps to keep the other check valve closed.
2. A device according to claim 1, characterized in that said two check valves (5a, 5b) are of the type usually closed, with lips made of a flexible material.
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 mouth of said valves (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.





European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0076

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 * the whole document * ---	1,3,4	A47L15/50 A47L15/23
A	FR 2 508 789 A (AKTIEBOLAGET ELECTROLUX) 7 January 1983 * the whole document * ---	1-4	
A	WO 83 01892 A (AKTIEBOLAGET ELECTROLUX) 9 June 1983 * claims; figures * ---	1	
P,X	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
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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