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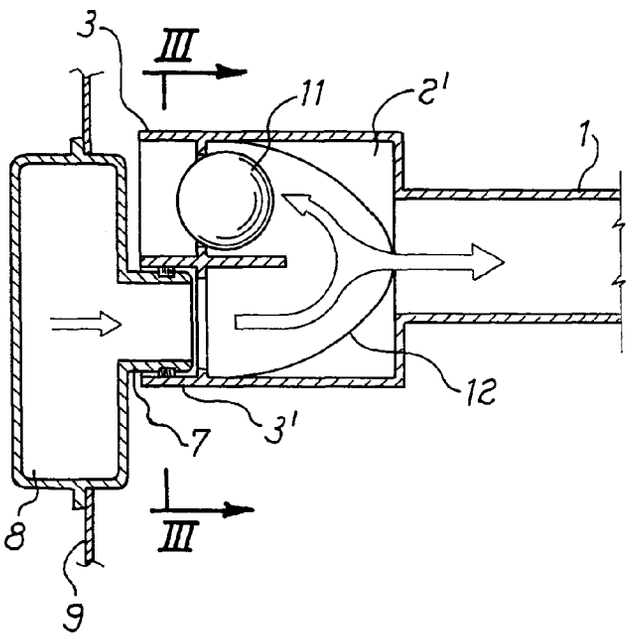
(54) Hydraulic connection device for a dishwasher rack which can be positioned at two different heights

(57) A hydraulic connection device for a dishwasher rack which can be positioned at two different heights includes a sprinkler feed duct (1), integral with the rack and extending upto the outlet (7) of the supply pipe, said duct (1) being provided with an enlarged end chamber (2, 2', 2") divided into an upper inlet (3) and a lower inlet (3') suitable to be alternately fit onto said outlet (7), as well as with shutter means moving inside said chamber (2, 2', 2") under the action of the water flow coming from the outlet (7) so as to open that inlet (3, 3') which is in use and close the one which is not in use. The shutter means may consist of a vane (4) rotatable around a horizontal pivot (5) located between the two inlets (3, 3'), or a ball (11) slidable along a guide rim (12), or a pair vanes (4', 4") arranged one on each inlet (3, 3'). The result is a simple, cheap and reliable device with no problems of tightness or high flow resistance.

Fig. 3a



EP 0 786 231 A2

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 said type of rack.

It is known that some dishwashers 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 downwards in open air. However, in the most common case of the sprinkler being fed through a duct extending upto 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 moved 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 according to 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 upto 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 greater 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 correct 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. Said 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 from the correct positioning of the rack.

Therefore the object of the present invention is to provide a hydraulic connection device for the upper rack suitable to overcome the abovementioned drawbacks of prior art devices.

This object is achieved by means of a device having the characteristics disclosed in claim 1.

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

A second advantage of the present device stems from the fact that the tightness is assured by the pressure of the water flow itself, even if the rack is not perfectly pushed backwards along its guides.

Still another advantage of the present device is the little flow resistance achieved by placing the shutter out of the main water flow.

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 three embodiments thereof, with reference to the annexed drawings wherein:

Fig.1a is a schematic, vertical, sectional view of a first embodiment of the device, with the rack placed in the upper position;
Fig.1b is a sectional view taken along line I-I of fig. 1a;
Fig.2a is a schematic, vertical, sectional view of the first embodiment of the device, with the rack placed in the lower position;
Fig.2b is a sectional view taken along line II-II of fig. 2a;
Fig.3a is a schematic, vertical, sectional view of a second embodiment of the device, with the rack placed in the upper position;
Fig.3b is a sectional view taken along line III-III of fig.3a;
Fig.4a is a schematic, vertical, sectional view of the second embodiment of the device, with the rack placed in the lower position;
Fig.4b is a sectional view taken along line IV-IV of fig.4a.
Fig.5 is a schematic, vertical, sectional view of a third embodiment of the device, with the rack placed in the lower position; and
Fig.6 is a schematic, vertical, sectional view of a third embodiment of the device, with the rack placed in the upper position.

With reference to figs.1a, 1b, 2a and 2b, there is seen that the first embodiment essentially consists of an upper sprinkler feed duct 1 provided at the rear end with

an enlarged chamber 2 divided into an upper inlet 3 and a lower inlet 3', which are identical and separate. These inlets 3, 3' can be alternately closed by a vane shutter 4 which rotates within chamber 2 around a horizontal pivot 5 located on the division wall between the two inlets, in correspondence with the axis of duct 1. Inlets 3, 3' are sized and shaped so as to fit externally on outlet 7 of the supply pipe 8, which projects from the rear wall 9 of the washing tank. The tightness between outlet 7 and inlet 3 or 3' is assured by a gasket 10.

As shown in figs.1a and 1b, when the rack is placed in the upper position the connection between the supply pipe 8 and the feed duct 1 is performed through the lower inlet 3'. The pressure of the water flow rotates vane 4 upwards until it closes inlet 3, and this closing position is maintained due to the water pressure itself. If the rack is moved to the lower position, as shown in figs.2a and 2b, the connection is performed through the upper inlet 3 and vane 4 will be rotated downwards by the flow so as to close inlet 3'.

It is clear that the mechanism for closing the inlet not in use is completely automatic and free from tightness problems. Furthermore, the water flow is subjected to a very small flow resistance since it does not directly flow into stagnation points.

The second embodiment illustrated in figs.3a, 3b, 4a and 4b is different from the previous embodiment only in the mechanism for closing the inlet not in use. In this case, the rotating vane 4 is replaced by a ball 11 which slides within chamber 2' along a guide rim 12 until it closes one of the inlets 3, 3' which are properly shaped with a circular seat. Chamber 2' is longer than chamber 2 in order to allow a smooth motion of ball 11 between the two closing positions. It should also be noted that the closing of the lower inlet 3' is made easier by gravity, which tends to pull down vane 4 or ball 11 from the upper position to the lower position.

The second embodiment illustrated in figs.5 and 6 is similar to the first embodiment but it includes two vane shutters 4' and 4" for the upper inlet 3 and the lower inlet 3', respectively. Furthermore, the enlarged chamber 2" is not centered with respect to the axis of the feed duct 1 but it extends upwards, whereby duct 1 is aligned with the lower inlet 3'. The outlet 7 of the supply pipe 8 may also be provided with tapered rims 13 which facilitate the entrance into inlet 3, 3' and open the vane shutters 4', 4". However, the presence of rims 13 is not strictly necessary in that vanes 4', 4" open anyway due to the action of the water under pressure and they close by gravity, since they are pivoted along their upper edge.

It is clear that the above-described and illustrated embodiments of the device according to the invention are just examples susceptible of various modifications. In particular, the shape and size of chambers 2, 2', 2" and of inlets 3, 3' may be freely changed according to the needs. Moreover, the two independent shutters or the single shutter moving between the two inlets may be made in other ways than vanes 4, 4', 4" and ball 11, as long as they are automatically operated by the incoming water flow.

Claims

1. A hydraulic connection device for a dishwasher rack which can be positioned at two different heights, including a sprinkler feed duct (1), integral with said rack and extending upto the outlet (7) of the supply pipe (8), characterized in that said duct (1) is provided with an enlarged end chamber (2, 2', 2") divided into a separate upper inlet (3) and lower inlet (3') suitable to be alternately fit onto said outlet (7), as well as with shutter means moving inside said chamber (2, 2', 2") under the action of the water flow coming from the outlet (7) so as to open that inlet (3, 3') which is in use and close the one which is not in use.

2. A device according to claim 1, characterized in that said shutter means consist of a single shutter which closes alternately that inlet (3, 3') which is not in use.

3. A device according to claim 2, characterized in that said shutter consists of a vane (4) rotatable within the chamber (2) around a horizontal pivot (5).

4. A device according to claim 2, characterized in that said shutter consists of a ball (11) which slides within the chamber (2') along a guide rim (12), the inlets (3, 3') being shaped with a circular seat.

5. A device according to claim 1, characterized in that said shutter means consist of a first vane (4') suitable to close the upper inlet (3) by rotating around a horizontal pivot, and a second vane (4") suitable to close the lower inlet (3') by rotating around a horizontal pivot.

6. A device according to one or more of the preceding claims, characterized in that the enlarged chamber (2, 2') is centered with respect to the axis of the feed duct (1).

7. A device according to one or more of claims 1 to 5, characterized in that the enlarged chamber (2") extends upwards with respect to the axis of the feed duct (1), the latter being aligned with the lower inlet (3').

Fig.1a

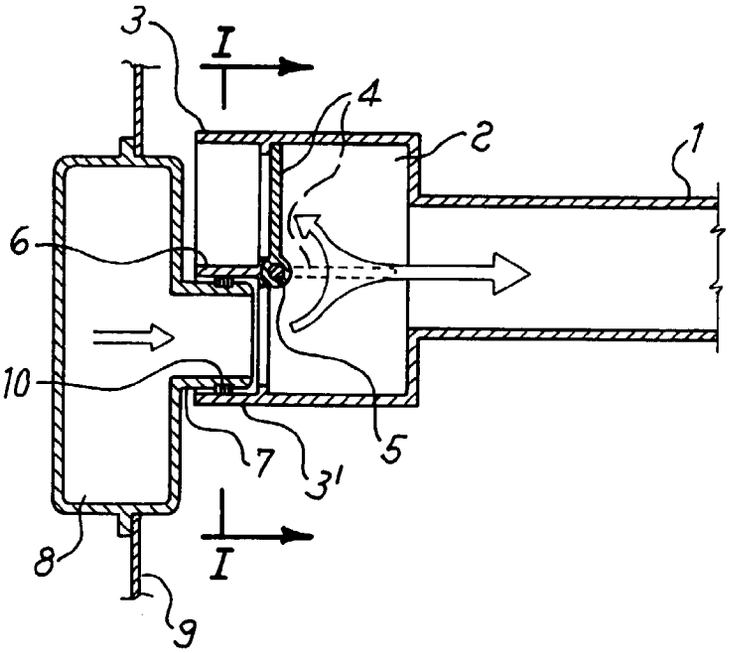


Fig.1b

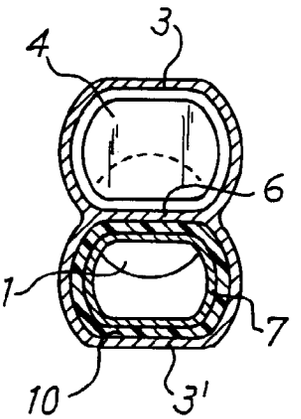


Fig.2a

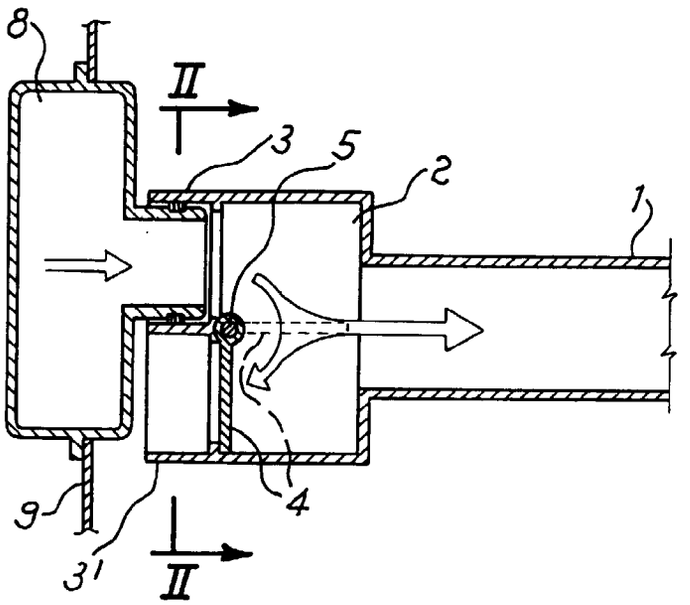


Fig.2b

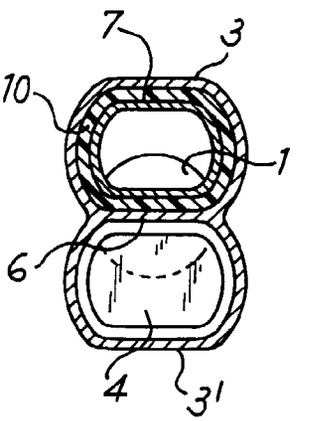


Fig.3a

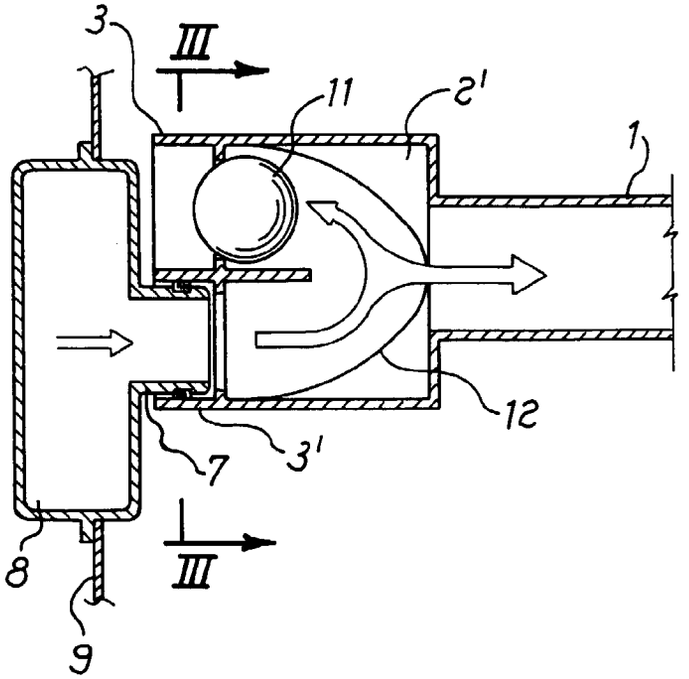


Fig.3b

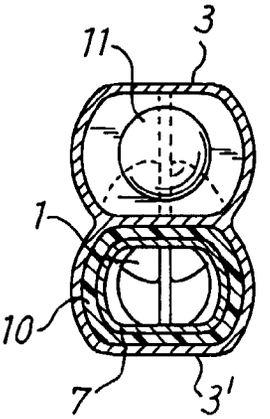


Fig.4a

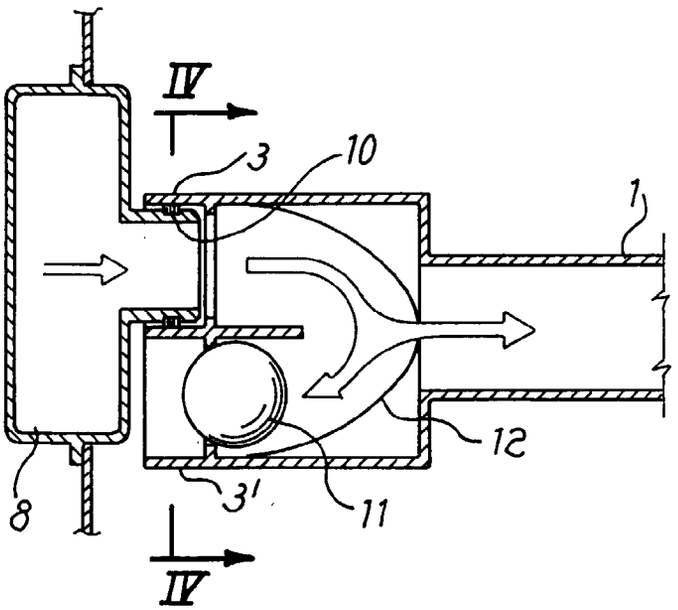
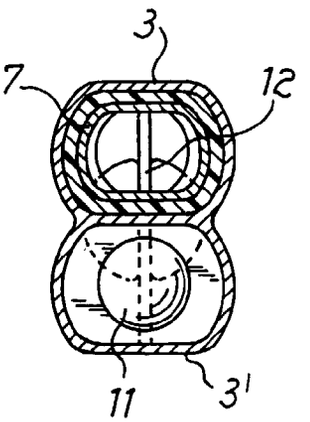


Fig.4b



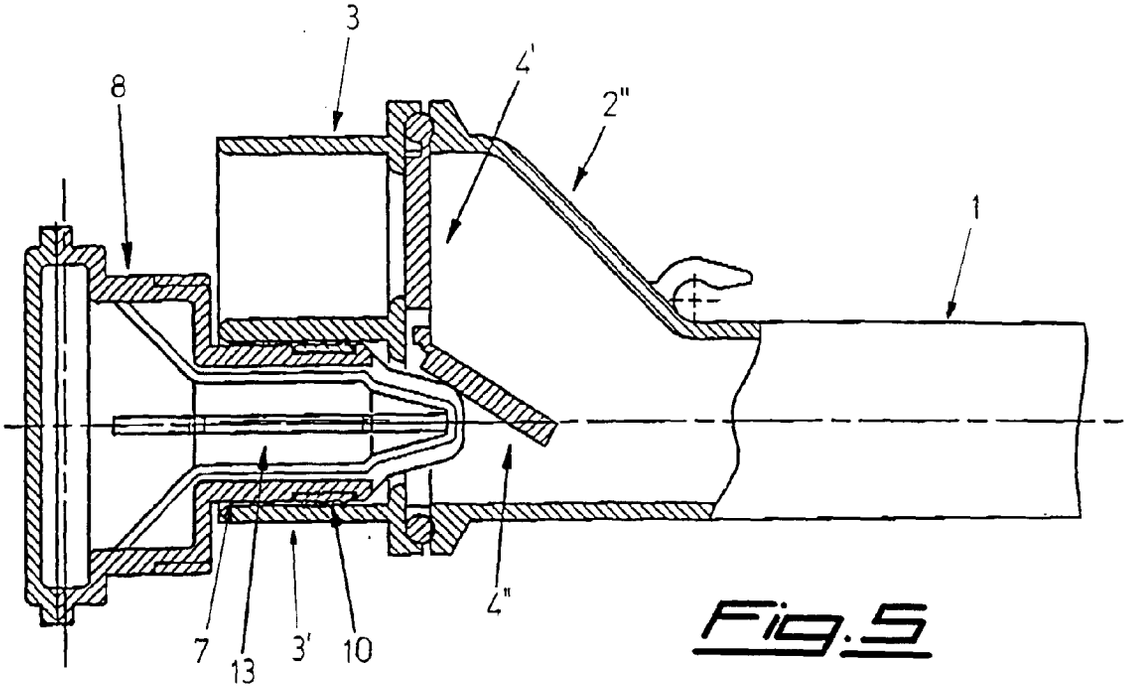


Fig.5

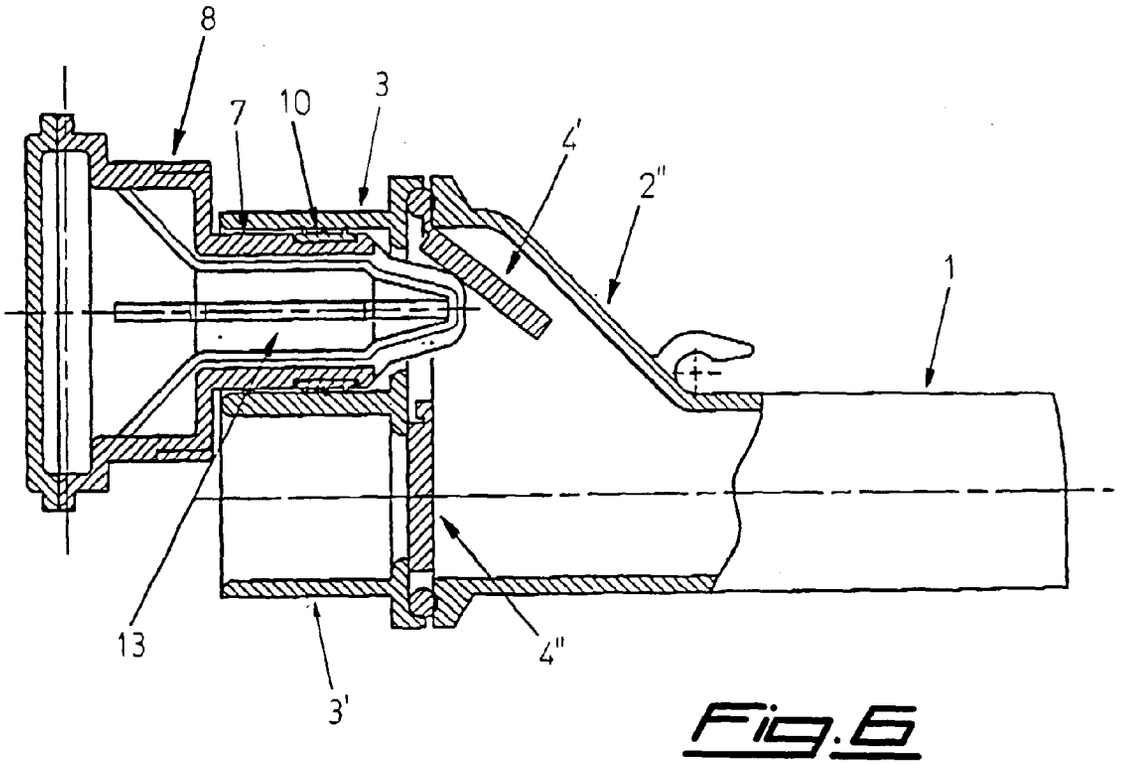


Fig.6