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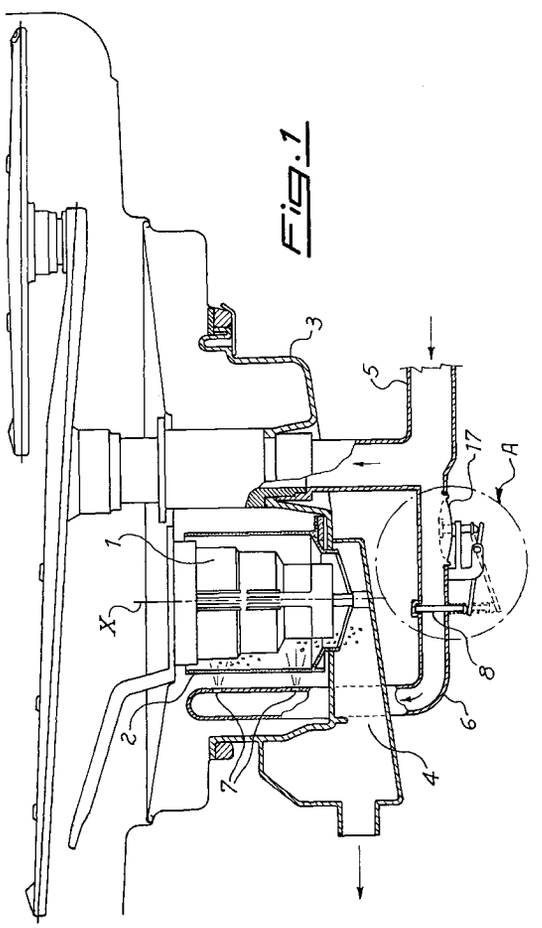
(54) Device for controlling the washing of the filter of a dishwasher

(57) A device for controlling the washing of the filter (2) of a dishwasher performed by nozzles (7) fed through a cleaning duct (6) which branches out from the feed duct (5) coming from the washing pump, includes a valve suitable to interrupt the water flow upstream from said nozzles (7), said valve being mechanically activated for closing, against the strength of an elastic member, through means suitable to transmit thereto the push of the water pressure. A possible embodiment includes a gate valve (8) activated through a lever (11) and a vertical small rod (14) pushed by a flexible membrane (17) which closes an opening formed in the wall of the cleaning duct (6).



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Description

The present invention relates to devices which make part of a dishwasher, and in particular to a device for controlling the washing of the filter of a dishwasher.

It is known that a dishwasher includes filters on the tank floor for the capture of the dirt particles which are removed from the dishes during the washing, in order to prevent said particles from circulating back in the washing water and possibly depositing again on the dishes. Generally, a first large-mesh filter is provided for capturing the large-size particles, and a second close-mesh filter, called "microfilter", for smaller particles.

Since the washing cycle includes several phases of loading and discharging water in the dishwasher tank, it is advisable that at each clean water loading the filters are ready to capture as many particles as possible, in order to increase the washing effectiveness. It is clear that the achievement of this result requires the filters to be cleaned at best, because if they are clogged they can not properly carry out their filtering function. To this purpose, cleaning nozzles are usually provided in a branch from the duct which feeds the water to the lower sprinkler. These nozzles eject counter-current jets which wash the microfilter, thus removing the dirt particles accumulated thereon.

Such a continuous microfilter cleaning operation keeps it always in perfect working order, but also has the drawback that the dirt is recirculated during the washing step. In fact, the microfilter is connected at the bottom with a discharge space through which the dirt is eliminated when the suction pump of the drain is activated. Therefore, when the drain pump is at rest and the discharge space is filled with water, the dirt removed from the microfilter can recirculate due to the high turbulence on the tank floor caused by the continuous water recirculation. This does not occur to large-size particles, captured by the large-mesh filter, owing to their much greater weight.

A conventional solution for limiting the cleaning of the microfilter to specific periods during the washing cycle is the use of an electromechanical control device. Such a device usually includes an electrovalve controlled by a pressure switch, so as to close the branch which feeds the water to the cleaning nozzles when the feed pressure reaches a pre-established value.

This type of device, though effective, has some drawbacks caused by its comparative complexity. In fact, not only the cost for producing and installing the pressure switch and the electrovalve has to be taken into consideration, but also the possibility of the failure of one of said members which would cause the global failure of the whole device. This can lead, for example, to the above-mentioned continuous washing which is preferably to be avoided, or even worse to no microfilter washing at all, with subsequent clogging thereof and poor washing effectiveness.

Therefore the object of the present invention is to provide a device for controlling the microfilter washing which is suitable to overcome the above-mentioned drawbacks.

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

A first essential advantage of the device according to the present invention is that it is extremely simple and completely mechanical, with positive consequences of lower cost, both for the production and installation, and absolute reliability.

A second advantage of said device comes from the fact that it is automatic, i.e. it is directly activated by the feed pressure without requiring a specific member for detecting said pressure.

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

Fig.1 is a schematic vertical sectional view of the tank bottom of a dishwasher provided with a first embodiment of the present device;
Fig.2 is an enlarged view of detail A of fig.1, which illustrates said first embodiment;
Fig.3 is a partial view similar to fig.1 and relating to a second embodiment of the device;
Fig.4 is an enlarged top plan view of detail B of fig. 3, which illustrates said second embodiment; and
Figs.5a and 5b are vertical sectional views taken along line Y-Y of fig.4, relating to the device in the opened and closed position respectively.

Referring to fig.1, there is seen that a dishwasher includes, as mentioned above, a large-mesh filter 1 and a microfilter 2 concentric thereto and revolving around the common axis X. Said filters are located on the floor of tank 3 and in communication with a lower discharge space 4. The water coming from the hydraulic network is loaded into the tank, and from here it is then sucked up by a washing pump which feeds it under pressure into the washing circuit through a feed duct 5. A cleaning duct 6 branches out from said duct 5 and terminates with some washing nozzles 7, which throw tangential jets on microfilter 2 for cleaning it while putting it into rotation, so as to act on its whole surface.

A first embodiment of the control device according to the present invention, located at the beginning of branch 6, is illustrated in detail in the enlargement of fig. 2. The device includes a vertical gate valve 8 on whose stem, outside from branch 6, a spring 9 is inserted between the seat of valve 8 and the hemispherical lower end 10 of the stem. Said end 10 is in contact with a lever 11, pivoted onto a support 12, whose opposite end is in turn in contact with the hemispherical lower end 13 of a small rod 14. This rod 14 is provided with a small top plate 15 and a bottom annular rim 16, which define the limits of the vertical displacement of rod 14 within a seat

formed in support 12. Finally, the device includes a flexible membrane 17 which closes an opening, concentric with rod 14, formed in the wall of the cleaning duct 6.

The operation of the above-mentioned device is very simple and reliable, in that it is based on the water feed pressure. Starting from the condition of opened valve 8, shown in dashed lines, the increase of the water level in the tank and therefore of the pressure at which the water is circulated by the washing pump, which sucks up less and less air, causes also the force exerted on the small plate 15 through membrane 17 to increase in proportion. During this phase, nozzles 7 clean microfilter 2 and, thanks to the reduced turbulence in the tank, the dirt particles can fall into the discharge space 4 which is progressively filled.

When the pressure reaches the pre-established value, the push on the small plate 15 is sufficient to overcome the strength of spring 9 and thus lower rod 14, which compresses spring 9 through lever 11 and raises the gate valve 8 into a corresponding seat 18 formed on the opposite wall of branch 6 (continuous line drawing). In this way, cleaning of microfilter 2 is interrupted and the latter carries out its function of capture of the dirt particles without having them recirculated due to the high turbulence now occurring in the tank. The pressure value at which closing of valve 8 occurs results from the combination of the surface of membrane 17, the stiffness coefficient of spring 9, and the length and pivot-point of lever 11. By changing said parameters it is possible to set a higher or lower pressure value for activating the device, i.e. a longer or shorter washing time of microfilter 2.

A second embodiment of the device according to the present invention is now illustrated with reference to figs.3, 4, 5a and 5b. The device is located in branch 6 also in this case, but at the bottom of tank 3 rather than near duct 5.

In particular, the same bottom of tank 3 is shaped so as to form a lower chamber 19 and an upper rim onto which an annular ring nut 20 is locked. The latter is integral with and end tube 21, in which the cleaning nozzles 7 are formed, through a plurality of ribs 22 (three in the illustrated example).

A spring 23, concentric with tube 21 and located within ring nut 20, is enclosed between ribs 22 and a lower annular plate 24 having an outer diameter larger than the inner diameter of ring nut 20. Furthermore, plate 24 has an L-shaped cross-section which at one end vertically abuts on a shoulder of chamber 19, and at the other end horizontally abuts against the outer wall of tube 21. In this way, plate 24 can freely shift within chamber 19 along tube 21, until it abuts against the lower surface of ring nut 20 (fig.5b; it should be noted that the play between plate 24 and chamber 19 has been exaggerated for sake of clarity of the drawing). A central stopper 25, suitable to close the inlet of tube 21, is connected to plate 24 by means of vertical ribs 26 having a length equal to or smaller than the vertical travel of plate 24.

Also in this second embodiment of the control device, the interruption of the cleaning of microfilter 2 is caused in a simple and reliable way by the pressure reached by the washing water. In fact, when the water pressure is low, the water enters chamber 19 and goes round stopper 25 to proceed into the cleaning tube 21, as indicated by the arrows in fig.5a. In chamber 19, the water exerts its pressure on both sides of stopper 25, therefore with a null vertical resultant, but only on the lower side of plate 24, thus pushing it upwards. As previously explained, when the pressure generated by the washing pump increases along with the water level in the tank, also the pressure on plate 24 in chamber 19 will reach a value sufficient to overcome the strength of spring 23. At this moment, plate 24 will shift upwards and move along therewith, through ribs 26, the stopper 25 which stops the water flow to nozzles 7 (fig.5b).

Hence, in this second case the valve is not of the gate type (8) but of the lift type (25), and the means for transmitting the push of the water pressure to the valve in order to overcome the strength of the spring (9, 23) consist of plate 24 with its connecting ribs 26 rather than the membrane-rod-lever mechanism (17, 14, 11) of the first embodiment.

It is clear that the above-described and illustrated embodiments of the device according to the invention are just examples susceptible of various modifications by adopting technically equivalent members. In particular, the valve type may be different, also of the rotating type such as a plug or butterfly valve, in said case spring 9 being of the coil type. Obviously, also the mechanism which transmits the push of water to the valve will be adapted to the type of valve, while retaining a device of the mechanical type in any member thereof.

Claims

1. A device for controlling the washing of the filter (2) of a dishwasher, performed by means of nozzles (7) fed through a cleaning duct (6) which branches out from the feed duct (5) coming from the washing pump, including a valve suitable to interrupt the water flow upstream from said nozzles (7), characterized in that said valve is mechanically activated for closing, against the strength of an elastic member, through means suitable to transmit thereto the push of the pressure of the water fed by said washing pump.

2. A device according to claim 1, characterized in that the valve is a vertical gate valve (8) on whose stem a spring (9) is inserted between the seat of the valve (8) and the lower end (10) of the stem, and in that the activation mechanism includes a lever (11) pivoted onto a support (12), in contact on one side of said pivot with said end (10) and on the other side

with the lower end (13) of a small rod (14) vertically movable within a seat formed in said support (12), as well as a flexible membrane (17), in contact with the upper end of said rod (14) and concentric thereto, which closes an opening formed in the wall of the cleaning duct (6).

3. A device according to claim 1, characterized in that it includes an annular ring nut (20) locked onto the upper edge of a chamber (19) formed on the floor of the tank (3) of the dishwasher, said ring nut (20) being integral with and end tube (21), in which the cleaning nozzles (7) are formed, through a plurality of ribs (22), as well as a spring (23) enclosed between said ribs (22) and an annular plate (24) concentric with said end tube (21) and movable within said chamber (19), the valve being a stopper valve (25) activated by said plate (24) through vertical ribs (26) having a length equal to or smaller than the vertical travel of the plate (24).

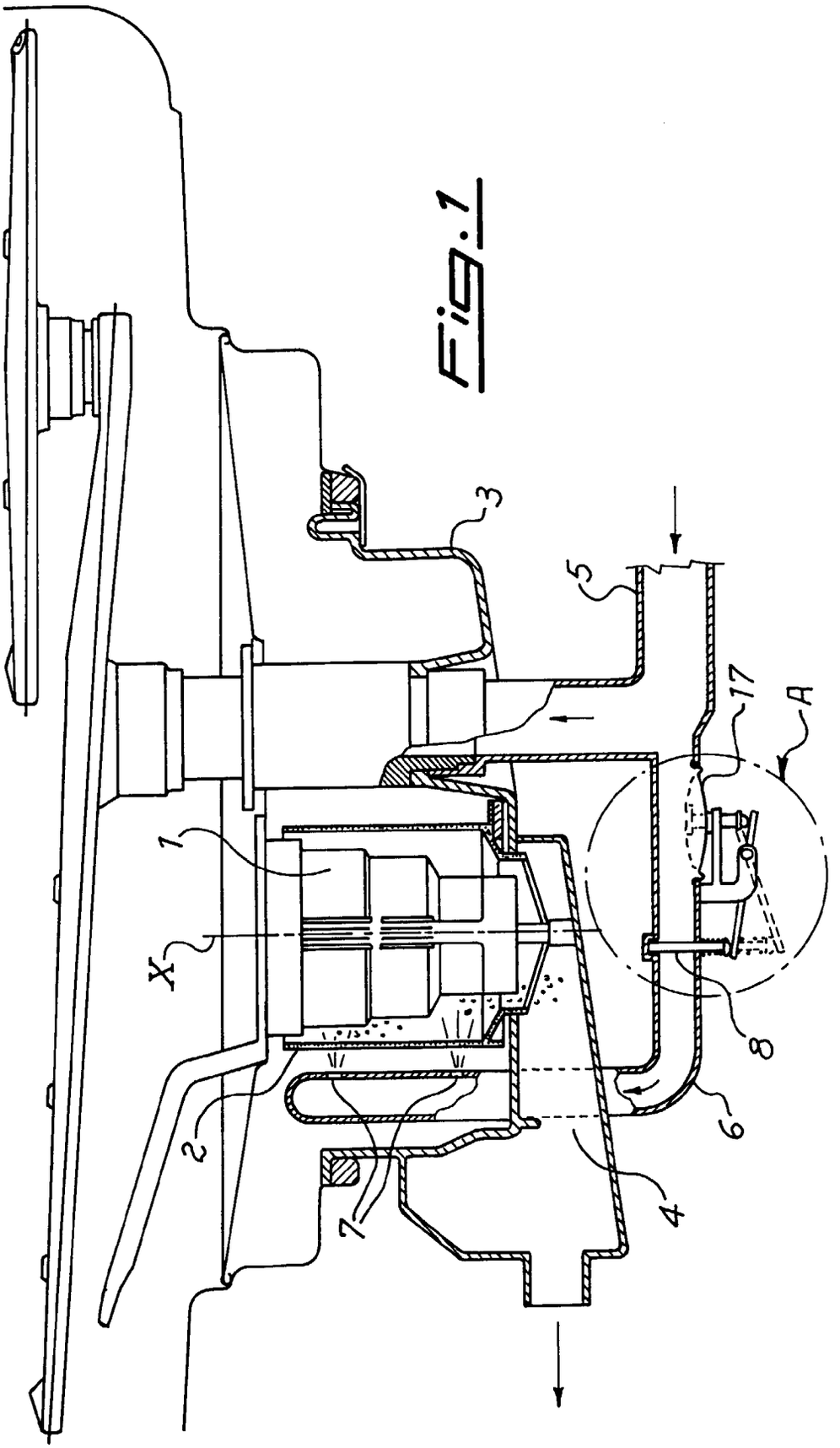


Fig.1

Fig.2

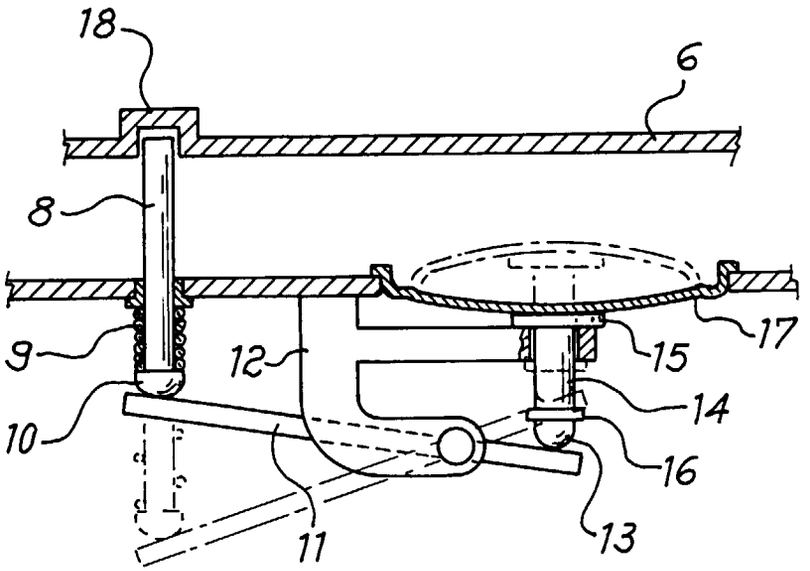


Fig.3

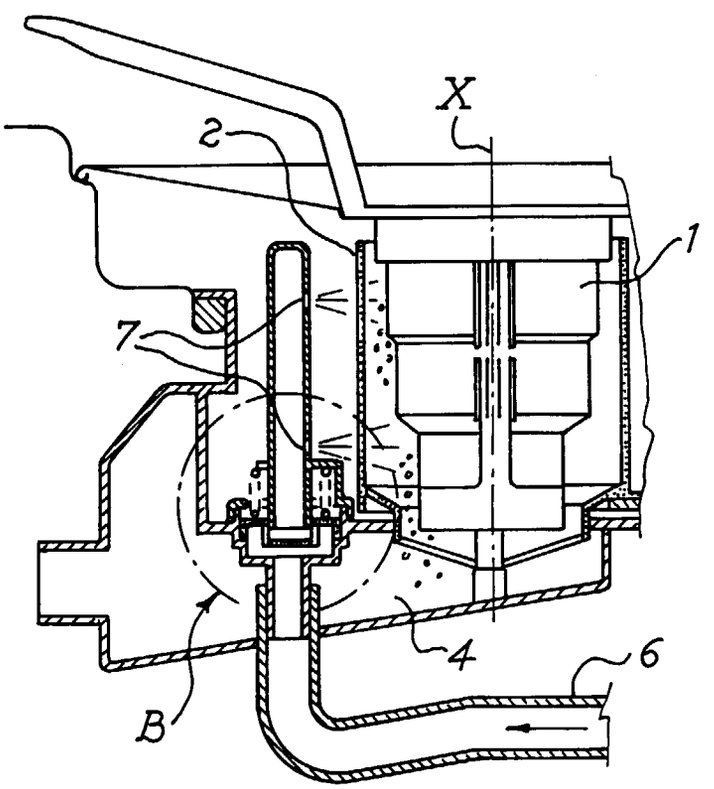


Fig.5a

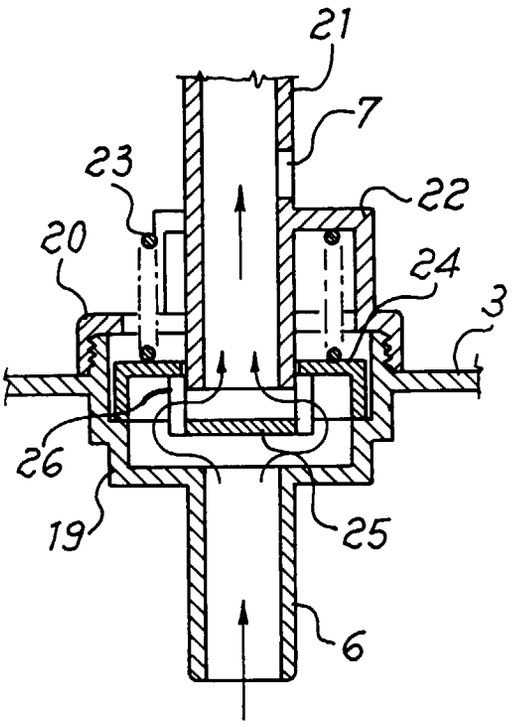
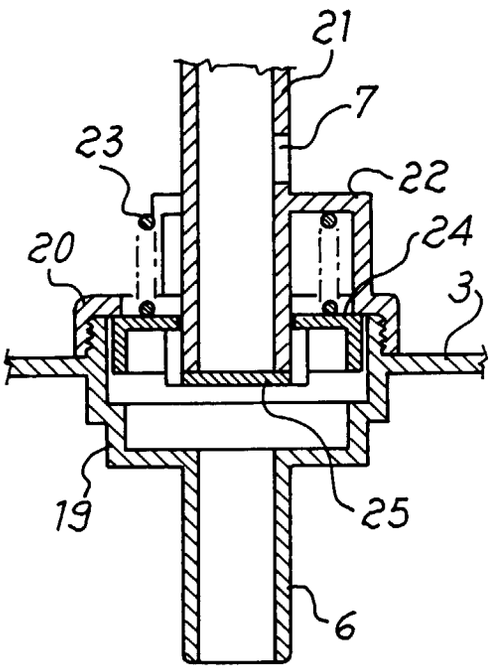


Fig.5b



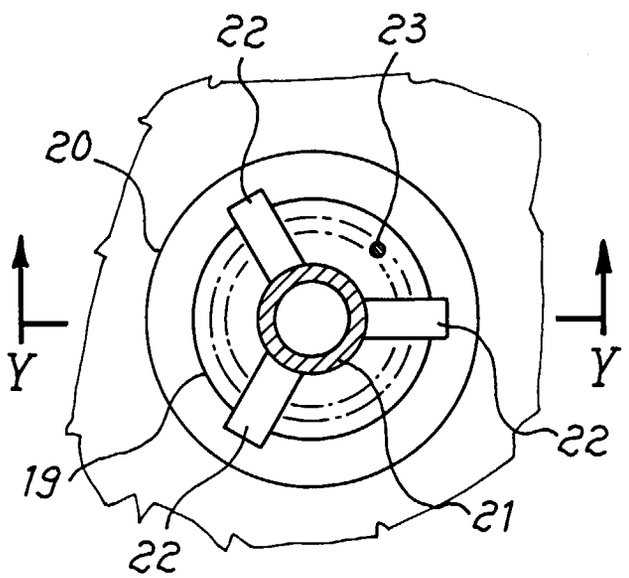


Fig.4