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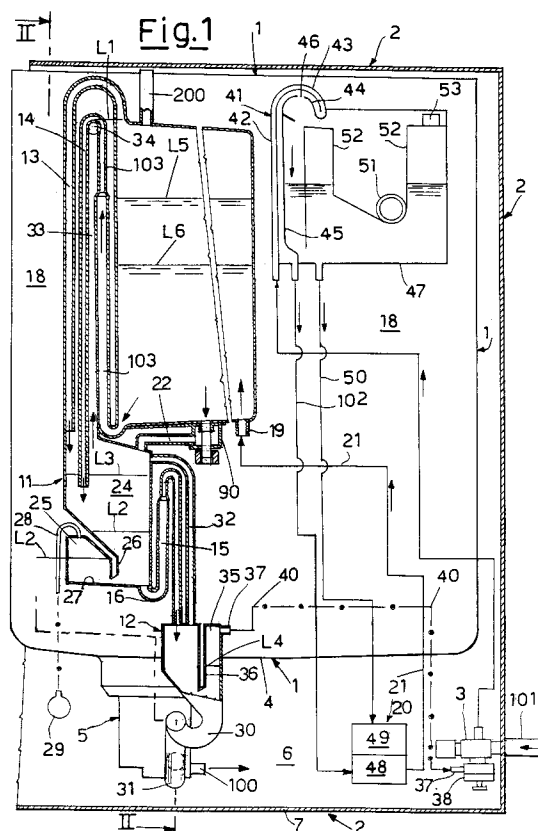
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I-20131 Milano (IT)(54) **Control device for feeding differentiated volumes of washing liquid in a dishwasher.**

(57) A control device for feeding differentiated volumes of a washing liquid in a dishwasher comprises a tank (10) with capacity equal to the first volume of liquid to be fed into a washing tub (1) of the dishwasher and which is supplied via feed valve means (3); the control device comprises first means (11-15;93) for transferring said first volume of washing liquid from the tank (10) to the washing tub (1), and second means (11-15,22,90;11'-15',91) which can be selected as an alternative to said first means (11-15;93) for the transfer from the tank (10) to the washing tub (1) of a second volume of liquid, smaller than said first volume.

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The present invention relates to a control device for feeding differentiated volumes of washing liquid in a dishwasher.

Standard dishwashers available on the market are sized, both in terms of capacity of the dish loading racks and the quantities of washing liquid, electrical energy and detergent required, to wash loads of twelve table settings. Naturally the dishwasher can be used for washing smaller loads, for example six table settings, however this does not lead to any saving in the washing liquid required by the dishwasher, nor in the necessary electrical energy required for heating thereof, the detergent etc.

The availability on the market of dishwashers for eight table settings, having smaller external dimensions (45 cm width) compared to standard dishwashers for twelve table settings, is also known. They allow a saving in the washing liquid, electrical energy for heating and detergent, but they are not flexible in that washing twelve table settings requires two successive washing cycles, and in this case they are even more costly than dishwashers for twelve table settings.

The Italian patent application no. MI94A000353 describes a device for controlling the level of the washing liquid in a dishwasher (assumed to be for twelve table settings) comprising a tank with capacity equal to half the quantity of liquid (5 litres) to be fed into the washing tub, which is supplied via a feed solenoid valve. A siphon triggers when the tank has been filled in order to transfer the washing liquid from the tank to a transfer recipient with smaller capacity compared to the tank, and de-triggers when the tank has been completely emptied. The transfer recipient is connected to the washing tub via another siphon, and a pressure chamber is related thereto and connected to a pressure switch which is actuated when the level of the liquid in the transfer recipient exceeds a predetermined level to cause closure of the feed solenoid valve. The 5 litres of liquid required for washing twelve table settings are fed by two successive fillings of the tank.

Such a device allows highly accurate control of the quantity of liquid fed into the washing tub due to the fact that said control is volumetric (the triggering of the programming device to cause closure of the feed solenoid valve is linked to filling of the tank, which has a very precise and known volume).

The use of this type of control device for a partial feed of washing liquid nevertheless creates problems. Experimental tests have in fact shown that the quantity of liquid required for washing six table settings is not 2.5 litres but instead 3.5 litres. In order to feed 3.5 litres of liquid it would be necessary to fill the tank with 2.5 litres of liquid and actuate a timed control on the feed solenoid valve

so that, after actuation of the pressure switch, the programming device maintains the feed solenoid valve open for a sufficient time for feeding into the tank 1 litre of additional liquid. It is nevertheless known that, by regulating the opening time of the feed solenoid valve, a very inaccurate control of the effective quantity of incoming liquid is achieved, due to unforeseeable variations in the pressure and flow rate of the external water supply system.

In view of the state of the art described, the object of the present invention is that of providing a control device which allows the feed of differentiated volumes of washing liquid in a dishwasher, so that with a standard dishwasher for twelve table settings it is possible to wash also six table settings, at the same time achieving a saving in the consumption of washing liquid, electrical energy for heating thereof and detergent. This device must also allow a sufficiently accurate control of the volumes of liquid fed, in order to ensure a constant reduction in consumptions.

In accordance with the present invention, this object is achieved thanks to a control device for feeding differentiated volumes of washing liquid in a dishwasher, comprising a tank with capacity equal to a first volume of liquid to be fed into a washing tub of the dishwasher and supplied via feed valve means, characterised in that it comprises first means for the transfer from the tank to the washing tub of said first volume of washing liquid and second means which can be selected as an alternative to said first means for the transfer from the tank to the washing tub of a second volume of liquid, smaller than said first volume.

By equipping a standard dishwasher for twelve table settings with a control device according to the present invention, two separate washing programmes can be adopted, for washing twelve and six table settings respectively, which require quantities of washing liquid, electrical energy and detergent which are differentiated and calibrated to the effective load of dishes to be washed. A dishwasher for twelve table settings can thus be used to wash six table settings, with a consequent saving, for a complete washing cycle, of washing liquid, electrical energy and detergent. Experimental tests have shown that this saving can be quantified at approximately 27% washing liquid, 27% electrical energy (from circa 1.6 kW for twelve table settings to approximately 0.9 kW for six table settings), 30% detergent, 30% salts for regenerating decalcifying resins, and a reduction of approximately 13% of the cycle time.

These and other features of the present invention will be made clearer from the following detailed description of some of its embodiments, illustrated by way of non-limiting examples in the accompanying drawings, in which:

Figure 1 shows, sectioned along a vertical plane, a dishwasher fitted with a control device according to a first embodiment of the present invention;

Figure 2 is a sectioned view along line II-II of Figure 1;

Figure 3 shows, in a view similar to that of Figure 1, a dishwasher fitted with a control device according to a second embodiment of the invention;

Figure 4 shows, in a view similar to that of Figure 1, a dishwasher fitted with a control device according to a third embodiment of the invention;

Figure 5 shows, in a view similar to that of Figure 1, a dishwasher fitted with a control device according to a fourth embodiment of the invention.

1 in Figure 1 denotes a washing tub of a dishwasher; the tub 1 is enclosed inside a frame 2 forming the external casing of the dishwasher. Mounted on said frame 2 is a feed solenoid valve 3 whereto a pipe 101 for feeding clean water is connected.

The washing tub 1 has a base 4 which converges towards a collection sump or basin 5 positioned below the tub 1 in a cavity 6 between the base 4 of the tub 1 and a base 7 of the frame 2. As shown in Figure 2, the tub 1 leads into the collection basin 5 through an aperture 8 covered by a perforated plate 9 with filter functions, which prevents the passage of washing residues. A drain pipe 100 is connected to the collection basin 5 and in turn to a drain pump not shown in that it is known. Also provided inside the washing tub 1 are two spraying rotors (not shown in that they are known), fed by one (or two) motor pump(s) (also not shown in that known) connected to the collection basin 5.

Figure 1 also shows a control device according to a first embodiment of the present invention. The control device comprises a tank 10, a first transfer recipient 11, and a second transfer recipient 12, connected by siphon pipes 13, 14 and 15. The whole is usefully housed in a cavity 16 between a lateral vertical wall 17 of the washing tub 1 and a lateral vertical wall 18 of the frame 2 (Fig. 2). In a preferred embodiment the tank 10, the two transfer recipients 11 and 12, and the siphon pipes 13, 14 and 15 are made by means of the technique of blow-moulding and form a single part. Nevertheless the control device can be made in several, separate parts, connected one to the other by pipes.

The tank 10 substantially has the shape of a rectangular parallelepiped and a capacity equal to the volume of water required by the dishwasher in a single feed phase of a conventional washing cycle with full load (i.e. for twelve table settings).

Since this volume of water is typically 5 litres, the tank 10 has a corresponding capacity of 5 litres. The tank 10 is provided on the base with an inlet mouth 19 through which decalcified water, coming from a decalcification assembly 20 (in itself known and which will be described hereinbelow), is fed to the tank 10. The pipe connecting the decalcification assembly 20 and the tank 10 is schematically denoted in Figure 1 by line 21. The siphon pipe 14 is also connected to the base of the tank 10, and flows into the first transfer recipient 11, which is positioned at a lower height from the base 7 of the frame 2 than the height of the tank 10. Also connected to the base of the tank 10, via a solenoid valve 90, is a conduit 22 which also flows into the first transfer recipient 11. The siphon pipe 13, also flowing into the first transfer recipient 11, is however connected to the top of the tank 10. Also connected to the top of the tank 10 is a breather pipe 200 whose upper aperture is positioned at a greater height than the elbow of the siphon pipe 13.

The first transfer recipient 11 has a much smaller capacity than the tank 10 and consists of two chambers 24 and 25, of different capacity, divided by a baffle 26 and only communicating on the common base 27. A capillary pipe 28 is connected at the top of the chamber 25, with smaller capacity and forming a pressure chamber, and is also connected at the other end to a pressure switch 29, which communicates with a programming device or timer (not shown) which controls operation of the dishwasher. Connected on the base 27 of the first transfer recipient 11, at the chamber 24, is the siphon pipe 15, which flows into the second transfer recipient 12; it is shaped so as to form below a siphon 30, and is connected, via a hose 31, to the collection basin 5. The end of the pipe 31 connected to the second transfer recipient 12 is positioned at a greater height than the end connected to the basin 5 in order to avoid back-flows of water from the basin 5 into the recipient 12. For the same reason the pipe 31 is bent to form also a siphon (Fig. 2). A conduit 32 connects the top of the second transfer recipient 12 to the top of the chamber 24 of the first transfer recipient 11, to ensure that they have the same internal pressure. Moreover a conduit 33, formed between the curve of the siphon pipe 14, connects the top of the chamber 24 to the outside, via a hole 34: in this way the pressure in the chamber 24 and in the second transfer recipient 12 is always equal to atmospheric pressure.

Like the first transfer recipient 11, the second transfer recipient 12 is also provided with a chamber 35 of small capacity, separated from a main chamber by a baffle 36 and forming a pressure chamber. A capillary pipe 37 branches off at the

top of the chamber 35 and is connected at the opposite end to a pressure switch 38 for pneumatically blocking the solenoid valve 3. This connection is schematically indicated in Figure 1 by the dotted and dashed line 40.

In output from the solenoid valve 3, the clean water coming from the water supply system is sent, in accordance with current regulations, to a so-called "air break" assembly in itself known. This assembly consists of a single block and is housed in another cavity similar to the cavity 16 of Figure 2 (given the limited width of the cavity 16, the tank 10 occupies virtually all the same cavity 16). The function of the air break assembly is to prevent the water in the water supply circuit of the dishwasher from being aspirated by the piping of the water supply system should vacuums be formed in the latter. It is substantially piping 41 comprising a vertical delivery section 42, an upturned "U" delivery section 43, an upturned "U" return section 44 and a vertical return section 45. A hole 46 is formed in the pipe section 44, below which a container 47 is positioned with volume of approximately 350 cc wherein the small quantity of water which falls from the hole 46 is collected for subsequent use by the decalcification assembly 20 during so-called regeneration of the decalcifying resins.

The decalcification assembly 20 comprises a segment 48 containing decalcifying resins and a segment 49 containing salts for regenerating the decalcifying resins.

During a normal phase of feeding water into the tub 1, the water coming from the section 45 of the piping 41 passes through the resins (a connection schematically indicated by the line 102) and from here is sent, decalcified, through the conduit 21, to the tank 10. During the phase of regeneration of resins, however, the water which is collected in the container 47 is sent, via a conduit represented by the line 50, to the segment 49 containing the salts in order to form a mixture of salted water for regenerating the decalcifying resins.

The air break assembly also comprises a device for condensating the steam which is produced in the washing tub 1, and which leaves the latter by passing through a conduit 51. The steam is partially condensated on the walls 52 of the container 47, before leaving the dishwasher through a breather hole 53.

It is assumed first of all that the dishwasher is programmed by the user to perform a cycle of washing twelve table settings. The programming device causes opening of the solenoid valve 3; the water flows along the piping 41 of the air break assembly into the segment 48 of the decalcifying device 20, decalcifies, and is sent to the tank 10. The solenoid valve 90 is kept closed, and the tank

10 is gradually filled, together with the rising section 103 of the siphon pipe 14. When the level of the water reaches the trigger level of the siphon 14, denoted by L1, the latter causes a rapid transfer of water from the tank 10 to the first transfer recipient 11. If the rate of flow of water entering the tank 10 is greater than the flow rate of the siphon 14, even after triggering of the latter the level of water in the tank 10 continues to rise. At a certain point the siphon 13 also triggers, which causes an increase in the flow rate required for transferring water to the recipient 11. In this way a high response speed of the control device is guaranteed.

Inside the first transfer recipient 11 the water is distributed in the two chambers 24 and 25. In the pressure chamber 25 the increase in the level of the water causes a gradual increase in the air pressure, and when this pressure exceeds a predetermined level (corresponding to a level of water L2) the pressure switch 29 is actuated and sends the command to close the solenoid valve 3 to the programming device. Given the small size of the first transfer recipient 11 compared to the tank 10, a small quantity of water, transferred from the latter, is sufficient for actuating the pressure switch 29. This means that the delay between the trigger instant of the siphon 14, corresponding to the filling of the tank 10, and the instant of closure of the solenoid valve 3 is very short and, consequently, the control on the amount of water fed is very accurate. When the level of water in the chamber 24 of the recipient 11 exceeds the level L3, the siphon 15 triggers and transfers the water into the second transfer recipient 12. The siphon 14 remains triggered until the tank 10 has been completely emptied, and the siphon 15 remains triggered until the first transfer recipient 11 has been emptied. The two siphons 14 and 15 remain triggered therefore until the water contained in the tank 10 has been completely transferred into the washing tub 1, via the siphon 30 and the pipe 31. In this way the 5 litres of water necessary for washing twelve table settings are fed into the washing tub, with a volumetric control of the quantity of water fed.

The pressure chamber 35 of the second transfer recipient 12 and the block pressure switch 38 form a safety control of the level of water in the tub 1 in order to prevent overflows following excessive feeding of water caused for example by a fault in the programming device or by manual interventions thereon which alter the predetermined operating sequence (for example setting the programming device at feed start). When the level of water in the tub 1 exceeds a maximum safety level, which is translated into a level L4 in the pressure chamber 35, the block pressure switch 38 is actuated, and the solenoid valve 3 is forced to close.

It is now assumed that the dishwasher is however programmed to wash a load of six table settings. The programming device causes the timed opening of the solenoid valve 3, so as to feed into the tank 10 a volume of water of approximately 3.5 litres or, as preferred, a slightly larger volume (level L5 in Figure 1). The control on the quantity of water fed in this way is not very precise, in that it is affected by the unforeseeable variations in pressure and flow rate of the water supply system. After closure of the solenoid valve 3, the programming device causes the timed opening of the solenoid valve 90, which opens the conduit 22 through which the water passes from the tank 10 to the first transfer recipient 11. As before, when the water reaches the level L3 in the chamber 24, the siphon 15 triggers and transfers the water to the second transfer recipient 12 and, from here, into the collection basin 5. The timed control of the opening of the solenoid valve 90 allows accurate control of the quantity of water transferred from the tank 10 to the washing tub 1, since the flow rate of the conduit 22 is known, like the pressure of the water column in the tank 10. Unlike the previous case, the control of the quantity of 3.5 litres is therefore timed, and not volumetric.

The water for rinsing the resins is fed in a similar way. The phase of rinsing the decalcifying resins is performed after the aforementioned regeneration of the same by mixing water and salts. The quantity of water required for full rinsing of the resins contained in the segment 48 of the decalcifying device is approximately 2.5 litres. In order to feed such a quantity of water, the programming device commands the timed opening of the solenoid valve 3, so as to cause feeding into the water circuit of the dishwasher of a quantity of approximately 2.5 litres (which means a level L6 in the tank 10). The passage of the water into the decalcifying device 20 rinses the decalcifying resins; the rinsing water enters the tank 10; this quantity of water is drained as before by means of the timed opening of the solenoid valve 90. It is however possible to use a smaller quantity of water than 2.5 litres for rinsing the resins, in proportion to the quantity of salt used for regenerating the same (which in the case of a cycle of washing of six table settings can be smaller than that used for twelve table settings).

Figure 3 shows a control device according to a second embodiment of the invention. Whereas in the case of the previous embodiment a single volumetric measurement circuit was provided, in this case two separate volumetric measurement circuits are provided for the control of the feed of 5 litres and 3.5 litres of water respectively. For this purpose, in addition to the siphon pipes 13 and 14, and the first transfer recipient 11 of the previous

embodiment, the control device also comprises: a siphon 14' similar to the siphon 14, but with a trigger level L1' corresponding to the reaching of a volume of water in the tank 10 of 3.5 litres; an additional first transfer recipient 11', wherein the siphon pipe 14' flows; a siphon pipe 13', similar to the pipe 13, but flowing into the transfer recipient 11'. The transfer recipient 11' is identical to the transfer recipient 11, comprising two chambers 24' and 25', chamber 25' being a pressure chamber connected, by means of a capillary pipe 28', to a pressure switch 29' which, like the pressure switch 29, communicates with the programming device. A siphon pipe 15' connects the base of the chamber 24' with the second transfer recipient 12 (a single one for the two volumetric measurement circuits), via a solenoid valve 91 and a conduit 92. A breather pipe 33', similar to the pipe 33, is also provided and which leads to the outside through a hole 34'.

When the dishwasher is programmed to wash a load of twelve table settings, the solenoid valve 91 is kept closed, and the signal of the pressure switch 29' to the programming device is inhibited. The working of the control device is identical to that of the control device of Figure 1, since although when the water in the tank 10 exceeds the trigger level L1' of the siphon 14' the latter transfers water into the recipient 11', the solenoid valve 91 does not allow the passage of water into the second transfer recipient 12. During the phase of discharging of the water from the tub 1, the solenoid valve 91 is opened to allow the discharge of the small quantity of water which has accumulated during filling of the tank 10 in the recipient 11'.

When however the dishwasher is programmed to wash a load of six table settings, the solenoid valve 91 is opened, and the signal of the pressure switch 29' is enabled. When the water in the tank 10 reaches the level L1', the siphon 14' triggers, the water is transferred rapidly into the recipient 11', and when the pressure of the air in the pressure chamber 25' exceeds a predetermined level (corresponding to the level of water L2'), the pressure switch 29' signals to the programming device to close the feed solenoid valve 3. When the level of water in the chamber 24' of the recipient 11' exceeds the trigger level L3' of the siphon 15', the transfer of the water into the second transfer recipient 12 (through the conduit 92) starts and from the latter, in the manner described, into the collection basin 5.

It is clear how in this embodiment both the control on the feed of 5 litres and that on the feed of 3.5 litres is volumetric.

The procedure for rinsing the decalcifying resins is the same as for a feed of 3.5 litres. In this case, however, the programming device performs a timed control on the opening of the solenoid valve

so that, after actuation of the pressure switch 29', it remains open for the time required for causing the transfer of 2.5 litres of water. The litre of water approximately which remains in the tank 10 (level LR of Figure 3) is to be reused in a subsequent feed phase.

Figure 4 shows a control device according to a third embodiment of the invention, which also allows mounting of the air break assembly in the single cavity 16 of the dishshwasher and, preferably, the formation in one single piece of the air break and control device, according to the solution described in the aforementioned Italian patent application No. MI94A000353. For this purpose the tank 10 requires an appropriate configuration in order to leave in the cavity 16 a space sufficient for housing the air break assembly. However the special configuration of the tank 10 forces changes to be made to the control device in relation to the previous embodiments.

As in the case of the device of Figure 3, two separate volumetric measurement circuits are again provided for controlling the feed of 5 litres and 3.5 litres of water respectively. The circuit for controlling the feed of 5 litres of water comprises the siphon pipe 14, the first transfer recipient 11 having a first chamber 24 connected by a siphon pipe 15 to the second transfer recipient 12 (a single one for the two volumetric circuits), and a second chamber 25 whereto a pressure switch 29 is connected. The circuit for controlling the feed of 3.5 litres comprises the siphon pipe 14', the first transfer recipient 11' having a first chamber 24' connected via a solenoid valve 91 and a conduit 92 to the second transfer recipient 12, and a second chamber 25' whereto a pressure switch 29' is connected. The siphon pipe 14 triggers when the tank 10 is full, while the siphon 14' triggers when 3.5 litres of water have been fed into the tank (divided between a first portion 80 and a second portion 81 of the tank 10).

Unlike the previous embodiments, the siphons 14 and 14' do not lead into the base of the tank 10, their mouths being positioned at a level H in relation to the base of the tank 10. The volume of the portion 80 of the tank 10 between its base and the level H is 1.5 litres, while the volume of the remaining portion 81 of the tank 10 is 3.5 litres. The base of the tank 10 leads, via a solenoid valve 93, to the second transfer recipient 12.

When the dishwasher is programmed to wash a load of twelve table settings, the solenoid valve 91 is kept closed and the pressure switch 29' is disabled. The solenoid valve 93 is also initially kept closed. The programming device causes the opening of the feed solenoid valve 3 to feed water into the tank 10. When the water in the tank 10 reaches the trigger level L1 of the siphon 14, the water is

transferred into the respective transfer recipient 11 (as in the case of the device of Figure 3, the siphon 14' triggers before the siphon 14, and transfers water into the respective first transfer recipient 11'; since however the solenoid valve 91 is closed, the water remains in the recipient 11'). When the pressure of the air in the pressure chamber 25 reaches a predetermined value (corresponding to the level of water L2), the pressure switch 29 is actuated and signals to the programming device to close the feed solenoid valve 3. The water is transferred to the second transfer recipient 12 and from the latter to the collection basin 5, in the manner described. When the water in the tank 10 falls below the level H (i.e. when the whole volume of 3.5 litres of water in the portion 81 of the tank 10 has been transferred), the siphon 14 de-triggers. The transfer of the remaining 1.5 litres of water in the portion 80 of the tank 10 is completed by means of the timed opening of the solenoid valve 93, commanded by the programming device. During the phase of draining of the water contained in the tank 1, the solenoid valve 91 is opened to drain the water which had accumulated in the recipient 11'.

When however the dishwasher is programmed to wash a load of six table settings, the solenoid valve 91 is initially kept closed and the sensor 29' is enabled. As before, the solenoid valve 93 is also initially kept closed. The programming device causes opening of the feed solenoid valve 3 to feed water to the tank 10. When the water in the tank 10 reaches the trigger level L1' of the siphon 14', the water is transferred into the respective transfer recipient 11'. When the pressure of the air in the pressure chamber 25' reaches a predetermined value (corresponding to the level of water L2'), the pressure switch 29' signals to the programming device to close the feed solenoid valve 3. At this point the programming device commands the opening of the solenoid valve 91, and the water is transferred from the recipient 11' to the recipient 12 and, from the latter, in the manner described, into the washing tub 1. When the level of water in the tank 10 falls below the level H (i.e. the whole volume of water which on triggering of the siphon 14' had been contained in the portion 81 of the tank 10), the siphon 14' de-triggers. The transfer of the remaining 1.5 litres of water contained in the portion 80 of the tank 10 is completed by means of the timed opening of the solenoid valve 93.

In this third embodiment therefore, the control on the feed of 5 litres and 3.5 litres of water is both volumetric and timed.

Figure 5 shows a control device according to a fourth embodiment of the invention which, as in the case of the device of Figure 4, allows assembly of the control device and air break assembly in the

same cavity 16.

The tank 10 has the same configuration as that of the device of Figure 4. Unlike the previous case, however, only one volumetric measurement circuit is provided, comprising the siphon pipe 14, the first transfer recipient 11 and the second transfer recipient 12, as in the case of Figure 1. The siphon 14 leads into the tank 10 at a level H in relation to the base of the latter. The volume of the portion 80 of the tank 10 below the level H is 1.5 litres, and the volume of the portion 81 of the tank 10 above the level H is 3.5 litres, for a total of 5 litres. The solenoid valve 93 is also provided and which connects the base of the tank 10 to the second transfer recipient 12.

In order to feed 3.5 litres of water the control by the pressure switch 29 is sufficient, in that when the water in the tank 10 reaches the trigger level L1 of the siphon 14 the feed solenoid valve 3 is closed, and the siphon 14 transfers a quantity of water equal to 3.5 litres from the tank 10 to the first transfer recipient 11, until the water in the tank 10 falls below the level H.

The procedure for feeding 5 litres of water is the same as in the previous case. After de-triggering of the siphon 14 the programming device causes the timed opening of the solenoid valve 93, so as to transfer the remaining 1.5 litres of water contained in the portion 80 of the tank 10 to the second transfer recipient 12.

In this fourth embodiment, the control on the feed of 3.5 litres of water is fully volumetric, while the control on the feed of 5 litres is partially volumetric and partially timed.

Also connected to the mouth 19 of the tank 10 is a two-way solenoid valve 95 whereto the conduit 21 coming from the decalcification assembly 20 is also connected as well as a further conduit 96 flowing into the second transfer recipient 12. During the normal phases of water feed the solenoid valve 95 allows the passage from the conduit 21 into the tank 10. During the phase of rinsing of the resins however, the solenoid valve 95 directly connects the conduit 21 with the conduit 96. In this way the water for rinsing the resins does not enter the tank 10, but is sent directly to the washing tub 1, wherefrom it is then drained.

Claims

1. Control device for feeding differentiated volumes of a washing liquid in a dishwasher, comprising a tank (10) with capacity equal to a first volume of liquid to be fed into a washing tub (1) of the dishwasher and supplied via feed valve means (3), characterised in that it comprises first means (14;14,93) for the transfer from the tank (10) to the washing tub (1) of said first volume of washing liquid, and second means (90;14';14',93;14) which can be selected as an alternative to said first means (14;14,93) for the transfer from the tank (10) to the washing tub (1) of a second volume of liquid, smaller than said first volume.
2. Control device according to claim 1, characterised in that said first means (14;14,93) comprise at least a first siphon pipe (14) leading into the tank (10) in order to trigger automatically when the first volume of liquid is contained in the tank (10) and de-trigger when said first volume of liquid has been completely transferred from the tank (10).
3. Control device according to claim 2, characterised in that said first siphon pipe (14) discharges into a first transfer recipient (11), with a smaller capacity than the tank (10), whereto first pressure switch detector means (25,28,29) are connected and which are actuated when the level of liquid transferred into the first transfer recipient (11) exceeds a first predetermined level (L2) to cause closure of said feed valve means (3), a second siphon pipe (15) being provided, leading into the first transfer recipient (11) and the washing tub (1), which triggers automatically when the level of liquid transferred into the first transfer recipient (11) exceeds a second predetermined level (L3), greater than said first level (L2).
4. Control device according to claim 3, characterised in that said first pressure switch detector means (25,28,29) comprise a pressure chamber (25) leading into the first transfer recipient (11), and a pressure switch (29).
5. Control device according to claim 3, characterised in that said second siphon pipe (15) discharges into a second transfer recipient (12) which leads into the washing tub (1).
6. Control device according to claim 5, characterised in that said second transfer recipient (12) is connected to second pressure switch detector means (35,37,38) suitable for causing the closure of feed valve means (3) when the level of liquid in the washing tub (1) exceeds a predetermined safety level.
7. Control device according to claim 3, characterised in that said second means (90;14';14',93;14) comprise valve means (90) which can be timed to actuate after said second volume of liquid has been fed into the tank (10) to transfer said second volume of liquid

from the tank (10) to the washing tub (1).

8. Control device according to claim 7, characterised in that said valve means (90) connect the base of the tank (10) to a conduit (22) which flows into the first transfer recipient (11).
9. Control device according to any one of the previous claims, characterised in that it is housed in a cavity (16) between a lateral vertical wall (17) of the washing tub (1) and a lateral vertical wall (18) of an external framework (2) of the dishwasher.
10. Control device according to claim 1, characterised in that said first means (14;14,93) comprise at least a first siphon pipe (14) leading into the tank (10) in order to trigger automatically when said first volume of liquid is present in the tank (10) and de-trigger when said first volume of liquid has been transferred completely from the tank (10), and in that said second means (90;14';14',93;14) comprise at least a second siphon pipe (14') leading into the tank (10) in order to trigger automatically when said second volume of liquid is contained in the tank (10) and de-trigger when said second volume of liquid has been transferred completely from the tank (10).
11. Control device according to claim 10, characterised in that said first siphon pipe (14) discharges into a first transfer recipient (11), with a smaller capacity than the tank (10), whereto first pressure switch detector means (25,28,29) are connected and which are actuated when the level of liquid transferred into the first transfer recipient (11) exceeds a first predetermined level (L2) to cause closure of said feed valve means (3), a third siphon pipe (15) being provided and leading into the first transfer recipient (11) and the washing tub (1), which triggers automatically when the level of liquid transferred into the first transfer recipient (11) exceeds a second predetermined level (L3) greater than said first level (L2), and in that said second siphon pipe (14') discharges into a second transfer recipient (11'), with a smaller capacity than the tank (10), whereto second pressure switch detector means (25',28',29') are connected and actuated when the level of liquid transferred into the second transfer recipient (11') exceeds a third predetermined level (L2') to cause closure of said feed valve means (3), a fourth siphon pipe (15') being provided, leading into the second transfer recipient (11') and the washing tub (1), which triggers automatically when the level of

liquid transferred into the second transfer recipient (11) exceeds a fourth predetermined level (L3') greater than said first level (L2').

12. Control device according to claim 11, characterised in that said first pressure switch detector means (25,28,29) comprise a first pressure chamber (25) leading into the first transfer recipient (11), and a first pressure switch (29).
13. Control device according to claim 11 or 12, characterised in that said second pressure switch detector means (25',28',29') comprise a second pressure chamber (25') leading into the second transfer recipient (11') and a second pressure switch (29').
14. Control device according to claim 11, characterised in that valve means (91) are provided and connected to said fourth siphon pipe (15') and which can be actuated to enable triggering thereof.
15. Control device according to claim 14, characterised in that it comprises a third transfer recipient (12) wherein discharge said third siphon pipe (15) and a conduit (92) connected in output to said valve means (91), which leads into the washing tub (1).
16. Control device according to claim 15, characterised in that said third transfer recipient (12) is connected to third pressure switch detector means (35,37,38) suitable for causing closure of the feed valve means (3) when the level of the liquid in the washing tub (1) exceeds a predetermined safety level.
17. Device according to any one of claims 10 to 16, characterised in that it is housed in a cavity (16) between a lateral vertical wall (17) of the washing tub (1) and a lateral vertical wall (18) of an external framework (2) of the dishwasher.
18. Safety device according to claim 1, characterised in that said first means (14;14,93) comprise at least a first siphon pipe (14) leading into the tank (10) in order to trigger automatically when said first volume of liquid is contained in the tank (10) and de-trigger when a first fraction of said first volume of liquid has been completely transferred from the tank (10), and in that said second means (90;14';14',93;14) comprise at least a second siphon pipe (14') leading into the tank (10) in order to trigger automatically when said second volume of liquid is contained in the tank (10) and de-trigger when a second fraction of

said second volume of liquid has been transferred from the tank (10), first valve means (93) also being provided, common to said first means (14;14,93) and said second means (90;14';14',93;14) which can be timed to actuate in order to complete transfer from the tank (10) of said first volume of liquid or said second volume of liquid.

19. Control device according to claim 18, characterised in that said first siphon pipe (14) discharges into a first transfer recipient (11), with a smaller capacity than the tank (10), whereto first pressure switch detector means (25,28,29) are connected and which are actuated when the level of liquid transferred into the first transfer recipient (11) exceeds a first predetermined level (L2) to cause closure of said feed valve means (3), a third siphon pipe (15) being provided, leading into the first transfer recipient (11) and the washing tub (1), which triggers automatically when the level of liquid transferred into the first transfer recipient (11) exceeds a second predetermined level (L3) greater than said first level (L2), and in that said second siphon pipe (14') discharges into a second transfer recipient (11') with a smaller capacity than the tank (10), whereto second pressure switch detector means (25',28',29') are connected and which are actuated when the level of liquid transferred into the second transfer recipient (11') exceeds a third predetermined level (L2') to cause closure of said feed valve means (3), second valve means being provided (91), connected to said second transfer recipient (11'), which can be actuated to enable transfer of liquid from the second transfer recipient (11') to the washing tub (1).
20. Control device according to claim 19, characterised in that said first pressure switch detector means (25,28,29) comprise a first pressure chamber (25) leading into the first transfer recipient (11), and a first pressure switch (29).
21. Control device according to claim 19 or 20, characterised in that said second pressure switch detector means (25',28',29') comprise a second pressure chamber (25') leading into the second transfer recipient (11') and a second pressure switch (29').
22. Control device according to claim 19, characterised in that it comprises a third transfer recipient (12) wherein discharge said third siphon pipe (15) and a conduit (92), connected in output to said second valve means (91),

which leads into the washing tub (1).

23. Control device according to claim 22, characterised in that said third transfer recipient (12) is connected to third pressure switch detector means (35,37,38) suitable for causing closure of the feed valve means (3) when the level of the liquid in the washing tub (1) exceeds a predetermined safety level.
24. Control device according to any one of claims 18 to 23, characterised in that it is housed in a cavity (16) between a lateral vertical wall (17) of the washing tub (1) and a lateral vertical wall (18) of an external framework (2) of the dishwasher.
25. Safety device according to claim 1, characterised in that said first means (14;14,93) comprise at least a first siphon pipe (14) leading into the tank (10) in order to trigger automatically when said first volume of liquid is contained in the tank (10) and de-trigger when a first fraction, equal to the second volume of liquid, of said first volume of liquid, has been completely transferred from the tank (10), and valve means (93) which can be timed to actuate in order to complete transfer from the tank (10) of said first volume of liquid, and in that said second means (90;14';14',93;14) comprise said first siphon pipe (14).
26. Safety device according to claim 25, characterised in that said first siphon pipe (14) discharges into a first transfer recipient (11), with a smaller capacity than the tank (10), whereto first pressure switch detector means (25,28,29) are connected and which are actuated when the level of liquid transferred into the first transfer recipient (11) exceeds a first predetermined level (L2) to cause closure of said feed valve means (3), a third siphon pipe (15) being provided, leading into the first transfer recipient (11) and the washing tub (1), which triggers automatically when the level of the liquid transferred into the first transfer recipient (11) exceeds a second predetermined level (L3) greater than said first level (L2).
27. Control device according to claim 26, characterised in that said first pressure switch detector means (25,28,29) comprise a pressure chamber (25) leading into the first transfer recipient (11) and a pressure switch (29).
28. Control device according to claim 26, characterised in that said second siphon pipe (15) discharges into a second transfer recipient

(12), which leads into the washing tub (1).

- 29.** Safety device according to claim 28, characterised in that said second transfer recipient (12) is associated with third pressure switch detector means (35,37,38) suitable for causing closure of the feed valve means (3) when the level of liquid in the washing tub (1) exceeds a predetermined safety level.
- 30.** Control device according to any one of claims 25 to 29, characterised in that it is housed in a cavity (16) between a lateral vertical wall (17) of the washing tub (1) and a lateral vertical wall (18) of an external framework (2) of the dish-washer.

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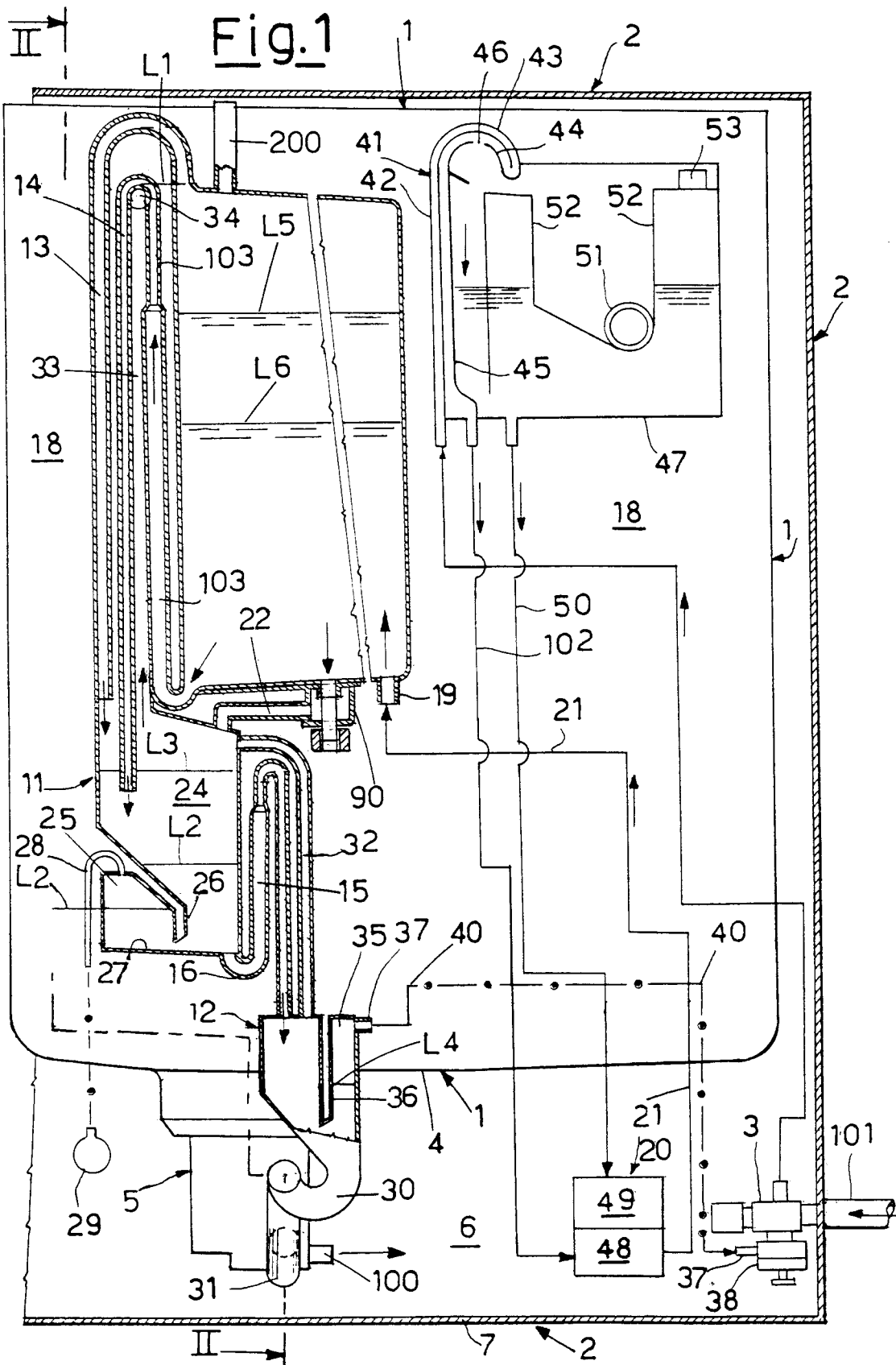
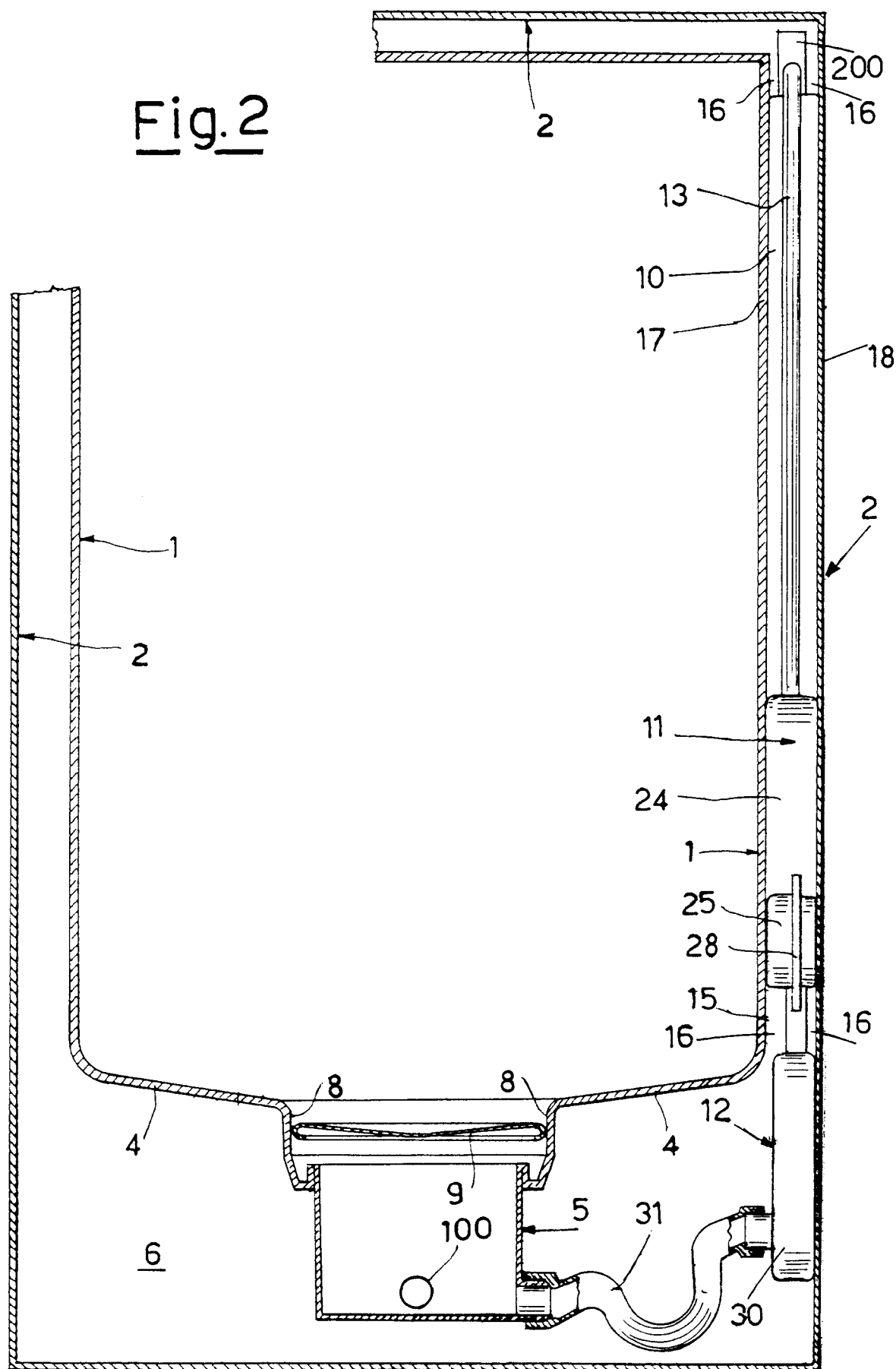
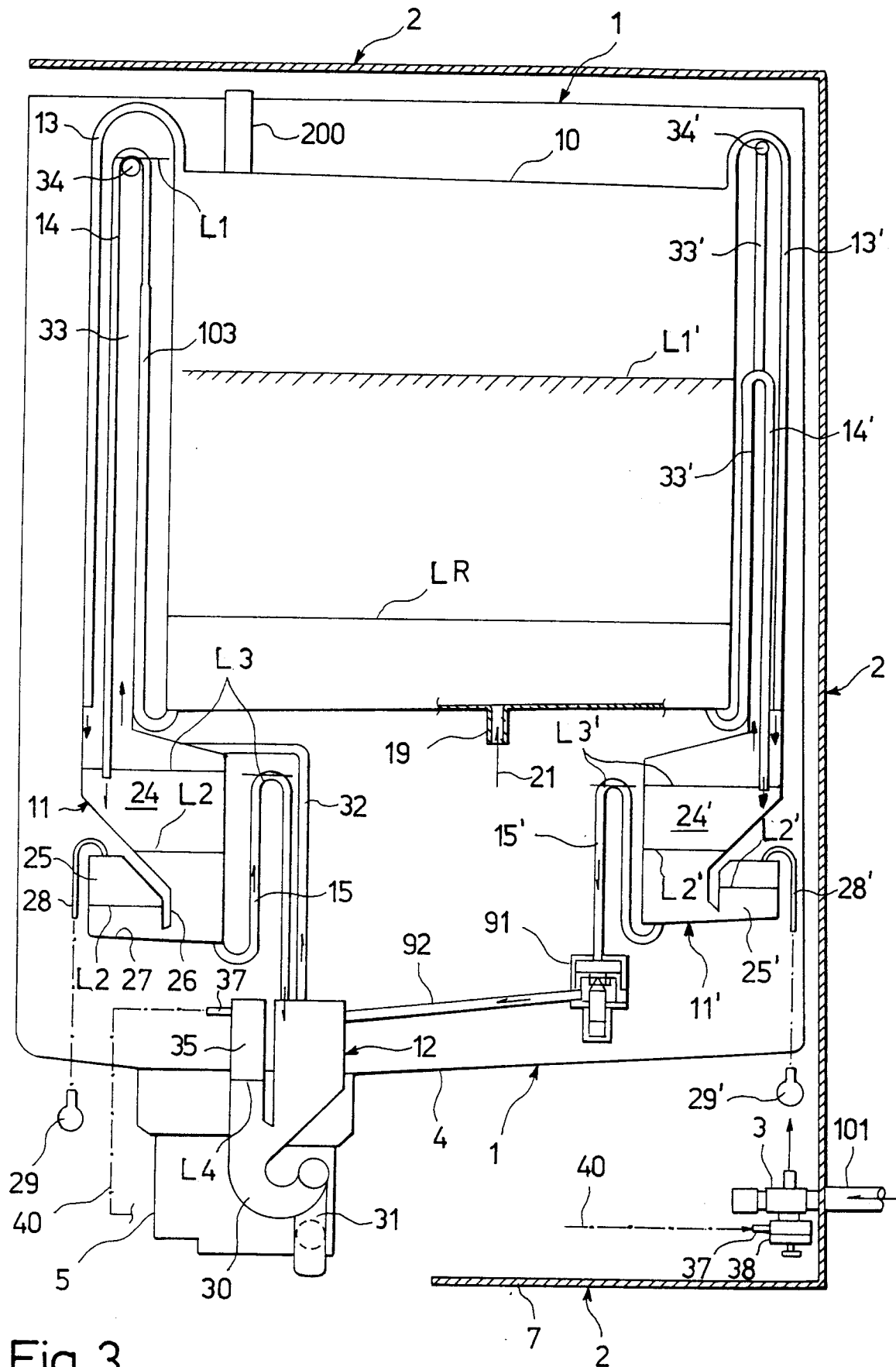


Fig. 2





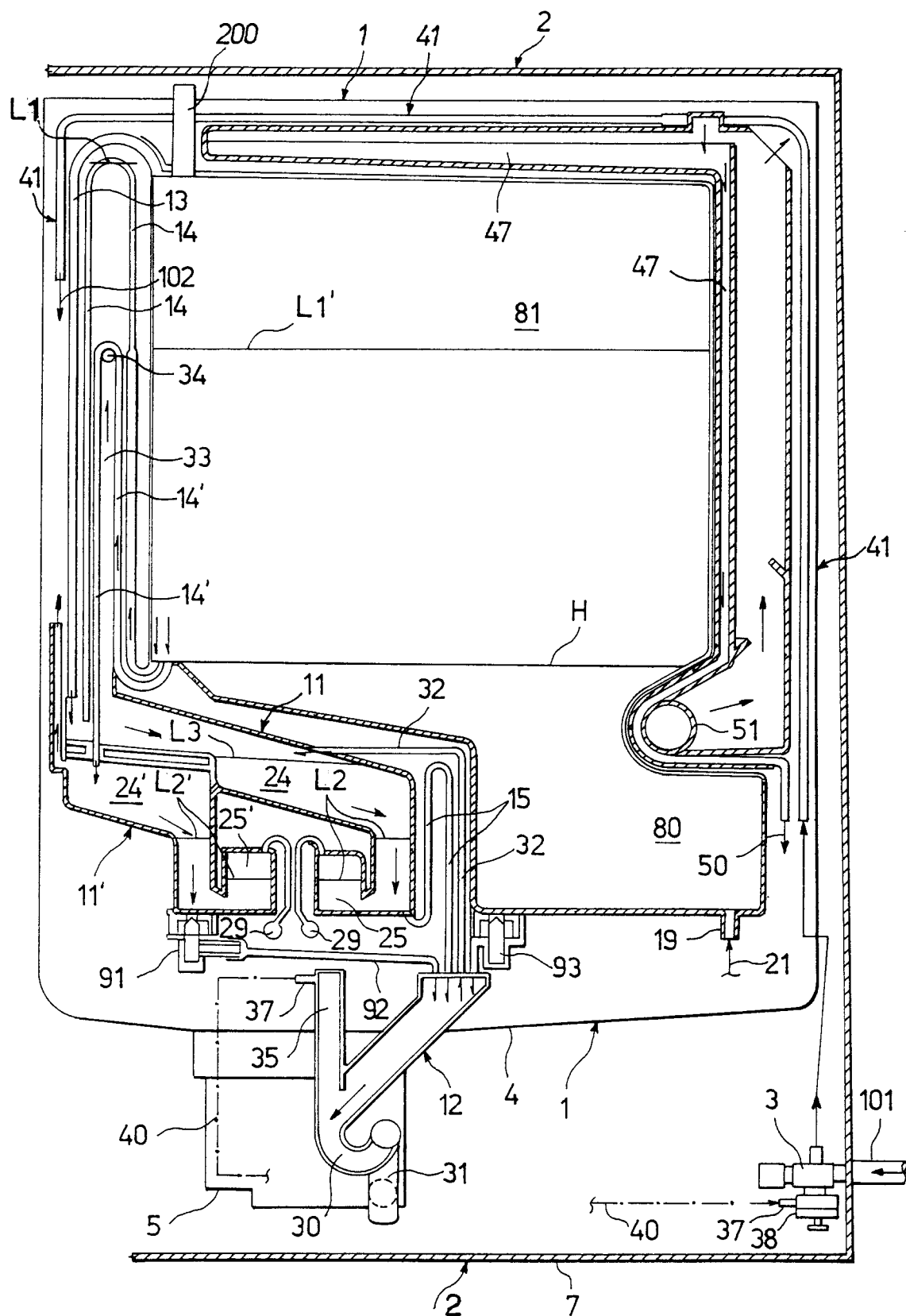


Fig. 4

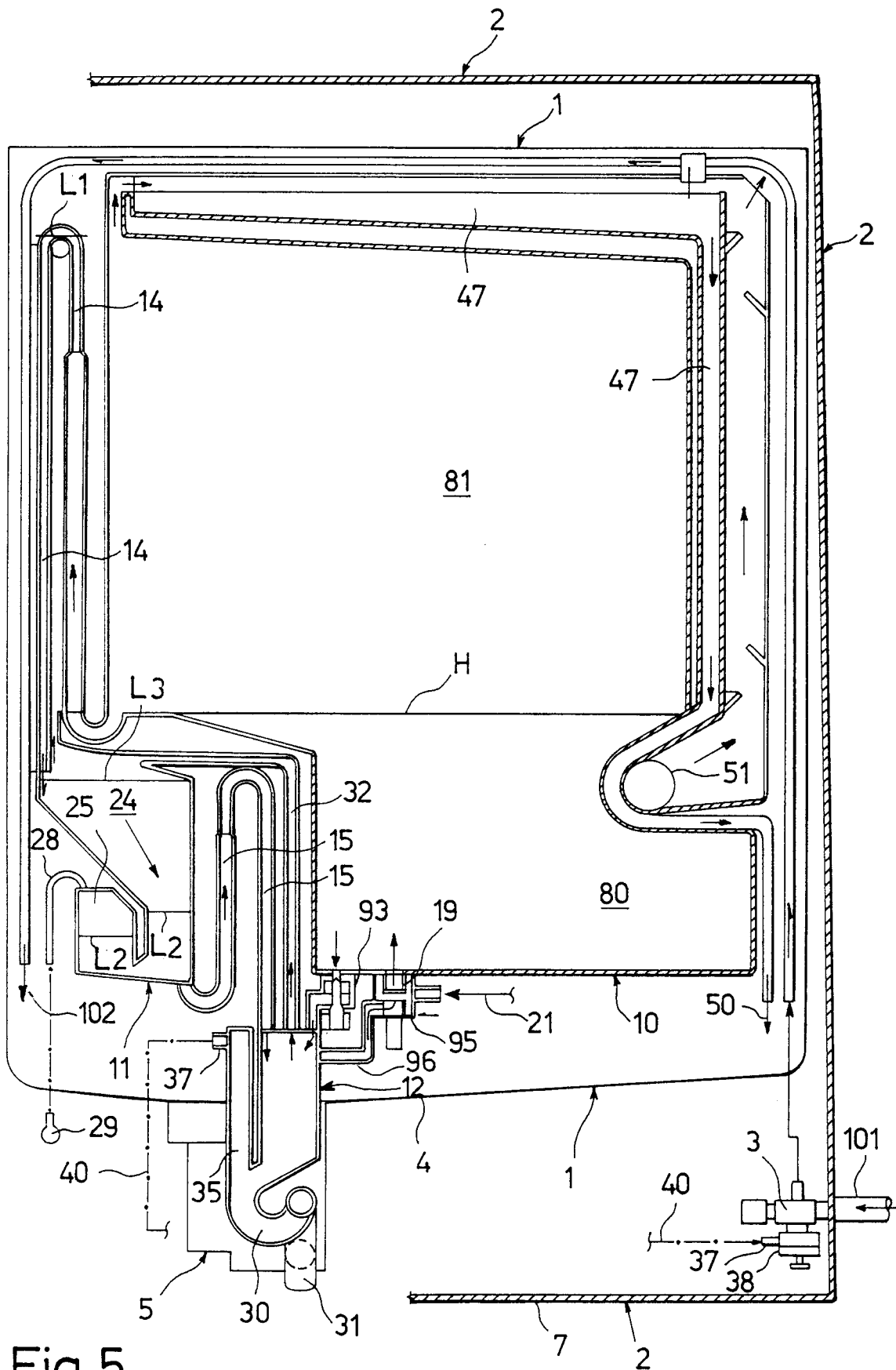


Fig. 5



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Application Number
EP 95 20 1375

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)
Y	GB-A-2 139 084 (BOSCH-SIEMENS HAUSGERÄTE GMBH) * page 1, line 110 - page 4, line 99; claim 1; figures 1,2,5 *	1,2	A47L15/00 A47L15/44 D06F39/02
A	---	5,7,9, 15,30	
Y	EP-A-0 341 766 (UNILEVER NV) * the whole document *	1,2	
A	---	7	
A	WO-A-93 20739 (MORTIN,B.S.) * the whole document *	1	
A	EP-A-0 498 044 (ZANUSSI ELETTRODOMESTICI S.P.A.) * the whole document *	1	
A	WO-A-84 01498 (MASKINFABRIKEN JEROS A/S) ---		
A	US-A-3 645 421 (TUTHILL,J.B.) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A47L D06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 September 1995	Examiner Munzer, E
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