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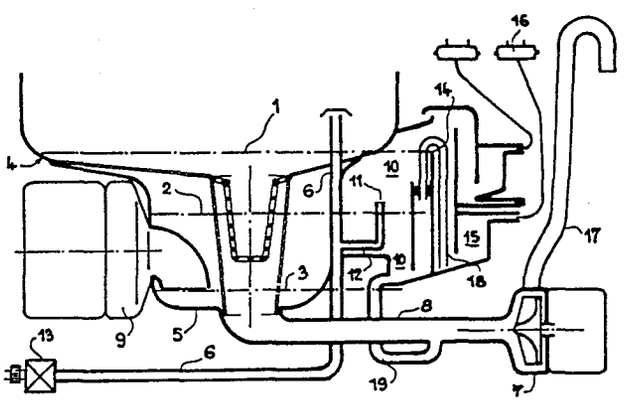
(54) Dishwashing machine having liquid level control means of the overflow type.

(57) A dishwashing machine having liquid level control means of the type defined above, comprising a connecting conduit (19) between the bottom of a first chamber (10) and the intake duct (8) of a discharge pump (7), the volume of said connecting conduit being at least equal to that of said first chamber (10) between a predetermined liquid level (1) and a dynamic liquid level (2), the bottom of said first chamber being disposed at a higher level than a residual liquid level (3) within said tub (4) at the end of a discharge phase. In addition, said discharge conduit (19) preferably has a higher flow resistance than said intake duct (8) of said discharge pump (7), whereby soiled liquid with impurities suspended therein is prevented from entering said first chamber.



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Dishwashing Machine Having Liquid Level Control Means of the Overflow Type

Description

The present invention relates to a dishwashing machine having liquid level control means of the overflow type.

More particularly, the invention concerns a dishwashing machine having liquid level control means of the type described in French Patent 1,385,971, wherein a first chamber adapted to be supplied with mains water communicates via an overflow partition with a second chamber associated with a pressostat adapted to control a solenoid valve itself controlling the mains water supply. In addition the first chamber communicates, through the intake duct of a discharge pump, with the washing tub of a washing machine. In operation the mains water is supplied to the tub under the control of the first chamber. As the water level reaches the level of the overflow partition, the water overflows into the second chamber, resulting in actuation of the pressostat for closing the water supply solenoid valve. The second chamber is connected to the intake side of the discharge pump through a siphon-type conduit, so that both chambers of the level control means are effectively emptied as the water is discharged from the tub.

This control device is of simple construction and reliable and accurate operation, since, in contrast to other known devices of this type, the pressostat is not actuated by a gradually rising pressure, but by a sudden pressure variation occurring as the water overflows from the first to the second chamber, so as to ensure accurately timed operation.

The described level control device presents certain drawbacks, however, when employed in a dishwashing machine as in the preferred embodiment.

This is because during certain phases of the operating cycle of a dishwashing machine (for instance a water supply phase following a soiled water discharge phase, or during temporary stoppage of the water circulation pump in the presence of water in the tub), particulate impurities suspended in the water contained in the discharge circuit of the machine may enter the first chamber. Although the first chamber is normally supplied with clean mains water, These impurities may be carried up to the overflow level so as to enter the second chamber to form a deposit therein which may in the course of time solidify and thus hamper the proper operation of the pressostat and/or prevent the second chamber from being completely emptied through the siphon-type conduit.

It is therefore a main object of the present invention to provide a dishwashing machine having a liquid level control means of the overflow type in which the problems arising from the formation of impurity deposits are substantially eliminated.

A further object of the invention is the provision of a dishwashing machine of the type defined above having liquid level control means of the overflow type which is of compact construction and may be integrated into the liquid collecting well of the dishwashing machine.

According to the invention, these objects are attained by a dishwashing machine having liquid level control means for controlling the liquid level in a washing tub adapted to have such liquid supplied thereto through a supply tube provided with a supply control valve and adapted to be substantially emptied during at least one discharge phase. Said level control means comprises at least one first chamber connected to said tub through the intake duct of a discharge pump and provided with a liquid inlet connected to said supply tube, said first chamber communicating with at least one second chamber via at least one overflow

arrangement by way of which the liquid overflows from said first chamber into said second chamber when the liquid in said tub reaches a predetermined level. Means sensitive to pressure are adapted to cause the supply valve to close when the liquid overflows into the second chamber, said liquid being adapted to descend to a dynamic level during at least one phase of the operation of a circulation pump. According to the invention, a dishwashing machine of the type defined above is mainly characterized by comprising a connecting conduit between the bottom of said first chamber and the intake duct of the discharge pump. The volume of said connecting conduit at least corresponds to the volume of said first chamber between said predetermined level and said dynamic level. The bottom of said first chamber is disposed at a higher level than the level of the residual liquid in said tub after a discharge phase.

The characteristics and advantages of the invention will become more clearly evident from the following description, given by way of example with reference to the accompanying drawing, the only figure of which shows a diagrammatical representation of a preferred embodiment of a dishwashing machine according to the invention.

With reference to the drawing, a dishwashing machine comprises a washing tub 4 (only partially shown) having at its bottom portion a well 5 for collecting the liquid the level of which is to be controlled. Tub 4 is adapted to be filled with mains water up to a predetermined level 1 through a supply tube 6 provided with an actuatable supply valve 13 of a per se known type. Tub 4 may be emptied in a conventional manner through a discharge pump 7 connected to a discharge conduit 17 down to a residual liquid level 3. To this purpose the bottom of well 5 is connected to pump 7 through an intake duct 8. A circulation pump 9 is provided for spraying dishes and the like (not shown) with the water collected in well 5. During this phase the liquid in tub 4 drops to a dynamic level 2 in a known manner.

The dishwashing machine is also provided with liquid level control means comprising at least one first chamber 10 having a calibrated inlet 11 for mains water connected to a branch duct 12 of supply tube 6. First chamber 10 is provided with at least one overflow arrangement 14 disposed at the predetermined level 1, by way of which it communicates with at least one second chamber 15 or overflow chamber. Associated to the latter is a pressostat 16 or the like adapted to be actuated when the liquid overflows from first chamber 10 into second chamber 15 for closing supply valve 13 in a per se known manner. A connecting conduit 19 connects the bottom portion of first chamber 10 to intake duct 8, and through the latter, to tub 4. Conduit 19 connects intake duct 8 also to second chamber 15 through a conventional siphon device 18 and a branch portion of first chamber 10.

According to one aspect of the invention the interior volume of connecting conduit 19 is at least equal to the volume of first chamber 10 between the predetermined overflow level 1 and dynamic level 2.

Connecting conduit 19 preferably offers a greater flow resistance to the flow of liquid than does intake duct 8. This requirement may obviously be met in various manners, for instance by forming conduit 19 with a contorted flowpath or by restricting its cross-sectional area.

In addition, the bottom of first chamber 10 is preferably disposed at a higher level than the maximum residual liquid level 3 which the liquid remaining in tub 4 may attain after the discharge phase. Connecting conduit 19 may not in any case be formed with vertical loops, as such loops would result in the undesirable formation of air locks.

With regard to operation of the described arrangement, the following explanations refer to those phases significant to the purposes of the invention.

At the end of a discharge phase, a certain amount of the soiled water contained in discharge conduit 17 flows by gravity back towards intake duct 8, and from there along a preferential flowpath into tub 4. This is because the relatively high flow resistance offered by connecting conduit 19 and the relatively high level at which this conduit opens into first chamber 10 prevent the soiled water from flowing into first chamber 10. The residual water in tub 4 will then stabilize at level 3, as already indicated.

During a subsequent supply phase (with supply valve 13 open) fresh water flows through supply tube 6 and from there through branch pipe 12 into first chamber 10 so as to fill the latter up to the overflow level 1. First chamber 10 is thus filled only with fresh water, which at the outset flows by gravity from inlet 11 through connecting conduit 19 towards intake duct 8. In this manner connecting conduit 19 is substantially filled with a volume of fresh water effective to displace the soiled water previously contained therein towards intake duct 8. When circulation pump 9 starts its operation, the level of the liquid in tub 4 and first chamber 10 drops to the dynamic level 2, as already stated, while the liquid in connecting conduit 19 remains substantially quiescent.

When circulation pump 9 is temporarily stopped during the dishwashing cycle, the liquid in the tub rises again from dynamic level 2 to the overflow level 1. In accordance with the law of communicating tubes, this rising of the level also occurs within first chamber 10. The liquid entering chamber 10 during this phase is the volume of fresh water which had flown into connecting conduit 19 during the preceding supply phase. As stated previously, this volume of fresh water forms an obstruction preventing impurities suspended in the discharge circuit of the dishwashing machine from entering chamber 10. As a result, chamber 10 is kept free of such impurities, as stated as

an object of the invention.

During a subsequent discharge phase, pump 7 substantially empties tub 4, first chamber 10 and, through siphon 18, also the overflow chamber 15. During this phase pump 7 removes any impurities which may have accumulated within connecting conduit 19, so that major accumulations are prevented from forming therein in the course of repeated operating cycles of the machine.

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Dishwashing Machine Having Liquid Level Control Means of the Overflow Type

Patent Claims

1. A dishwashing machine having means for controlling the level of a liquid in a washing tub adapted to be filled with said liquid through a supply tube provided with an actuatable supply valve and to be substantially emptied during a discharge phase, said level control means comprising at least one first chamebr connected to said tub through the intake duct of a discharge pump and provided with an inlet for said liquid connected to said supply tube, said first chamber communicating with at least one second chamber via at least one overflow arrangement for the overflow of said liquid from said first chamber to said second chamber as the liquid in said tub reaches a predetermined level, pressure-sensitive means being provided for causing

said supply valve to close when said liquid overflows into said secodn chamebr, said liquid being adapted to drop to a dynamic level during at least one phase of the operation of a circulation pump,

characterized by comprising a connecting conduit (19) between the bottom of said first chamber (10) and said intake duct (8) of said discharge pump (7) the volume of said connecting conduit being at least equal to the volume of said first chamber (10) between said predetermined level (1) and said dynamic level (2), the bottom of said first chamber (10) being disposed at a higher level than a residual liquid level (3) within said tub (4) after said discharge phase.

2. Dishwashing machine according to claim 1, characterized in that said connecting conduit (19) has a higher flow resistance than said intake duct (8) of said discharge pump (7).

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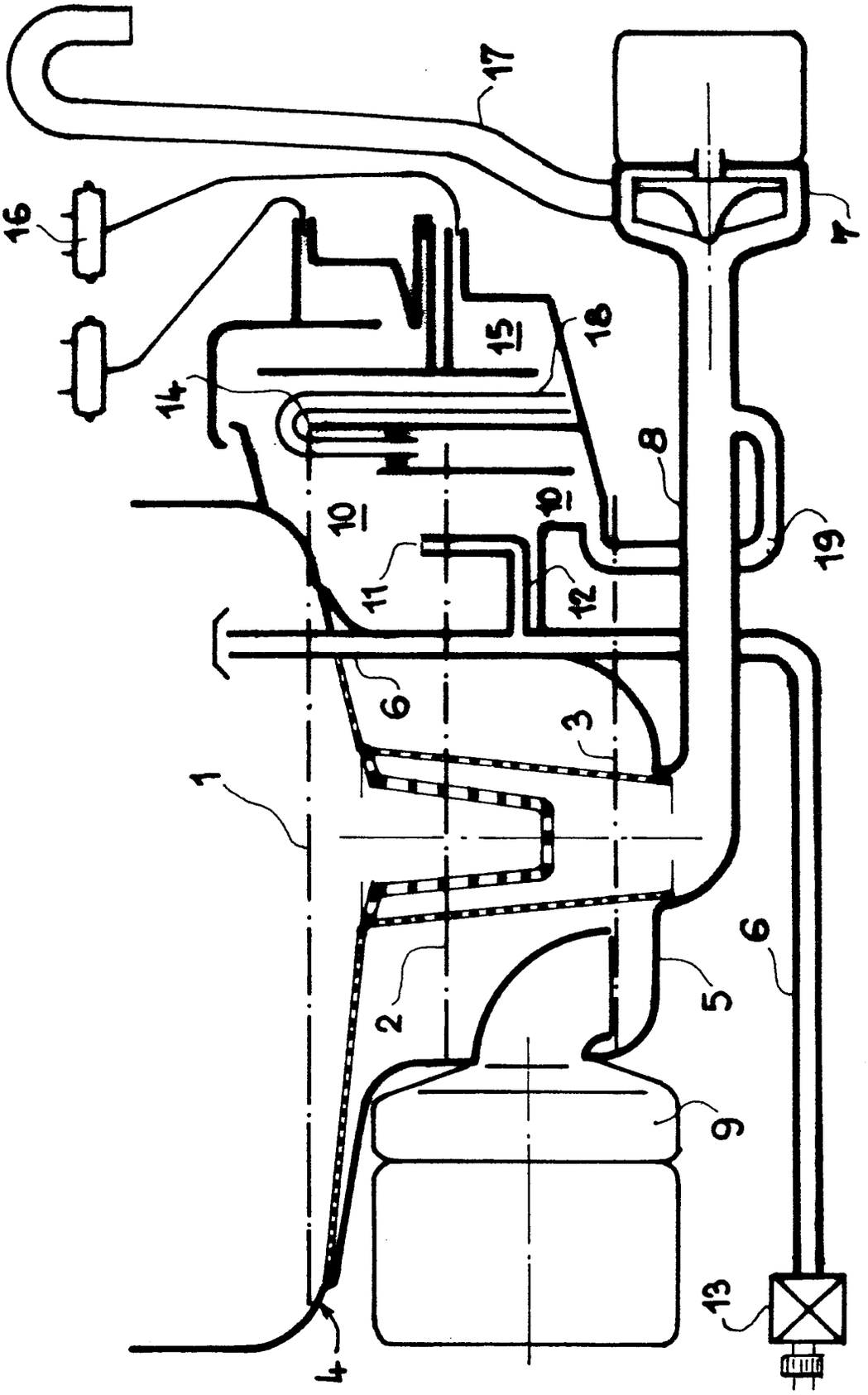

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 85 10 1458

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.4)
A	US-A-3 294 110 (RAUSZER) * Whole document *	1,2	A 47 L 15/32 D 06 F 39/08
A	DE-A-2 439 400 (EUROPE MAN) * Whole document *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

A 47 L
D 06 F
G 01 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10-05-1985	SCHARTZ J.

CATEGORY OF CITED DOCUMENTS

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