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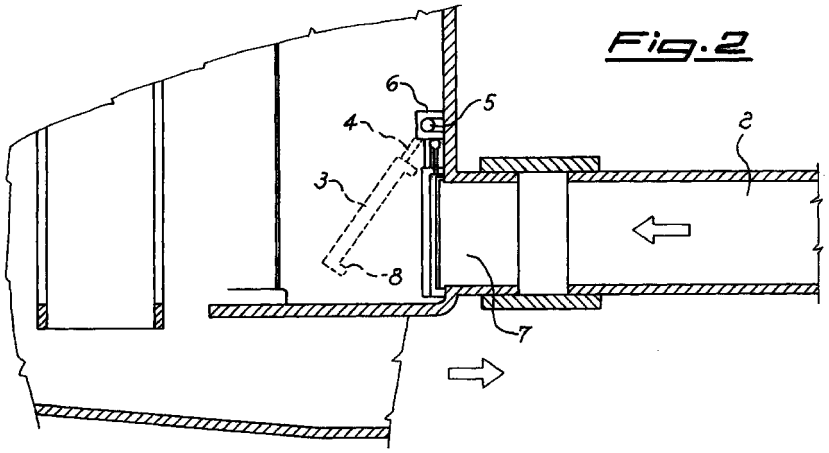
(54) Unidirectional shutter for level control systems in dishwasher machines

(57) The present invention relates to a unidirectional shutter which can be applied to control systems for the quantity of water loaded in a dishwasher machine, suitable for preventing the emergency block of the machine due to incidental openings and closures of the dishwasher when very hot water is inside. Said shutter is capable of closing up the pipe (2) connecting the tank (1) of a dishwasher to said level control system with possibility of opening only in the direction of the dishwasher loading flow.

Fig.2



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Description

[0001] The present invention relates to level control systems for dishwasher machines, particularly it relates to a unidirectional shutter suitable for preventing the anomalous working of said systems.

[0002] Various systems are known suitable for detecting an excessive accumulation of water in the tank of a dishwasher machine and for intervening, as a consequence thereof, by blocking the machine.

[0003] Mostly, said systems are located outside the tank of the dishwasher. The location outside the tank ensures a better reliability with respect to the systems which carry out the control directly in the tank, because the latter are often affected by the high temperature changes which take place during the various washing steps.

[0004] Said external systems comprise a pipe whose lower end has its outlet into the tank bottom, whereas the upper end is located above the level corresponding to the maximum level allowed for water. For the principle of the communicating vessels, the raising of the water level in the pipe is the signal for excessive accumulation of water in the tank. Therefore, means for detecting the raising of the water level up to the safety level are arranged in the pipe. For example, in some systems a sensor arranged at the safety level detects an approaching float positioned in the pipe. Alternatively, said pipe has its outlet into a tight chamber containing air whose pressure is checked by a thrust meter. Said detection means are often used in a succession in order to detect several emergency stages and to inform the user of a bad functioning of the machine before it is blocked by the safety system.

[0005] However, the above described control or safety systems have the drawback that they actuate the emergency block also when an increase of the air pressure in the tank takes place after the water loading.

[0006] Particularly, this situation takes place when during the working the dishwasher, which contains very hot water, is opened and closed again. The air inside the tank, cooled at the opening, regains heat by absorbing it from the water and therefore expands with resulting pressure increase. Therefore, the water is pushed from the tank into the control system until it reaches the safety level, thus causing the dishwasher to block.

[0007] Obviously, in this case the block does not respond to a real problem of the water loading system, but it is itself a problem because the user is often not able to find the cause thereof and make the machine start again.

[0008] Therefore, object of the present invention is providing a device which, applied to the level control system for dishwashers, eliminates said drawback. Said object is obtained by a unidirectional shutter whose main features are specified in the first claim and other features are specified in the following claims.

[0009] Further advantages and features of the unidirectional shutter according the present invention will appear to those which are skilled in the art from the following detailed description of one embodiment thereof with reference to the accompanying drawings wherein:

- Figure 1 shows a schematic view of the tank of a dishwasher and of a pipe which connects it to a control or security system outside the tank, provided with a shutter according to said embodiment of the present invention; and
- Figure 2 is a cross-sectioned view of the shutter according to the embodiment of figure 1.

[0010] With reference to figure 1, there is shown that a pipe 2 which forms the end portion of the pipe through which clean water from the net is supplied to the machine is connected in a known way to the bottom of tank 1 of a dishwasher. Pipe 2 has a first horizontal portion and a second portion that extends vertically at least up to a level corresponding to the maximum water level allowed in the tank, indicated with A. At its upper end pipe 2 is connected to a safety and control system, not shown, comprising one or several sensors for detecting the raising of the water level. The shutter according to one embodiment of the present invention, which can be opened only towards the inside of the tank, is positioned at the outlet section 7 of pipe 2 into tank 1.

[0011] Now, with reference to figure 2, the shutter is shown to be hinged to the tank internal wall at outlet section 7 of pipe 2. It is formed of a plate 3 having a shape corresponding to and slightly larger size than outlet section 7. On the face turned towards outlet 7 said plate is provided with a protruding edge 8 so that, when the shutter is closed, said edge abuts against the wall of tank 1. Plate 3 is hinged, for example by means of a small rod 4, to the wall of tank 1 above outlet 7. The hinge comprises a pin 5 inserted and rotating inside a seat 6 integral with the tank wall.

[0012] First, the water coming from the supply system flows through empty pipe 2 and, by pressing against plate 3, causes the shutter to open towards the inside of the tank. For the principle of the communicating vessels, the levels of the water in tank 1 and in pipe 2 raise up at the same time to the working level. While this occurs, the shutter remains opened because of the hydrodynamic thrust of the water passing into the tank, and the safety system prevents, with opened shutter, a too large quantity of water from being loaded. When the working level has just been reached, the hydrodynamic thrust stops and, at equilibrium, the shutter falls in the vertical closing position because of gravity. The dishwasher starts the normal washing cycle. At this point, a possible raise of the air pressure in the tank only results in a compression of plate 3, particularly with the edge 8 thereof, against the walls of tank 1 around outlet 7: access to pipe 2 from tank 1 is prevented. Resultantly, the safety system of the dishwasher is isolated from the

tank during all the dishwasher working steps, but for the following water loading steps during which again it carries out the control function.

[0013] In a particular embodiment of the present invention, a return spring of plate 3 can be provided, having enough power for bringing back the shutter and keeping it in the closing position once the hydrodynamic thrust of the loaded water is finished. On the other side, the power of said spring must be easily won by the hydrodynamic thrust during the water loading step.

[0014] Further variation and additions may be made by those which are skilled in the art to the embodiment herewith described and illustrated by remaining within the scope of the invention itself. Particularly, a unidirectional shutter of another type can be used in order to isolate the safety system of a dishwasher tank starting from the end of the loading step. Said shutter can be located at any position along the pipe which connects said control system to said tank.

Claims

1. A shutter suitable for closing up a pipe (2) connecting the tank (1) of a dishwasher to the loading level control system arranged outside the tank (1), characterized in that it is unidirectional with opening in the direction of the dishwasher loading flow.

2. A shutter according to claim1, characterized in that it is arranged at the outlet of the pipe (2).

3. A shutter according to claims 1 and 2, characterized in that it can be opened by means of the water hydrodynamic thrust and closed because of gravity in conditions of hydrostatic equilibrium.

4. A shutter according to claim 3, characterized in that it is formed of a plate (3) having a shape corresponding to and slightly larger size than the outlet section (7) of the pipe (2) and hinged to the wall of tank (1).

5. A shutter according to claim 4, characterized in that the plate (3) has protruding edges (8) suitable for abutting against the walls of the tank (1) around the outlet (7) of pipe (2).

6. A shutter according to claims 1 and 2, characterized in that it comprises a spring suitable for bringing the shutter in the closing position at the end of the hydrodynamic loading thrust, with a return power lower than said thrust.

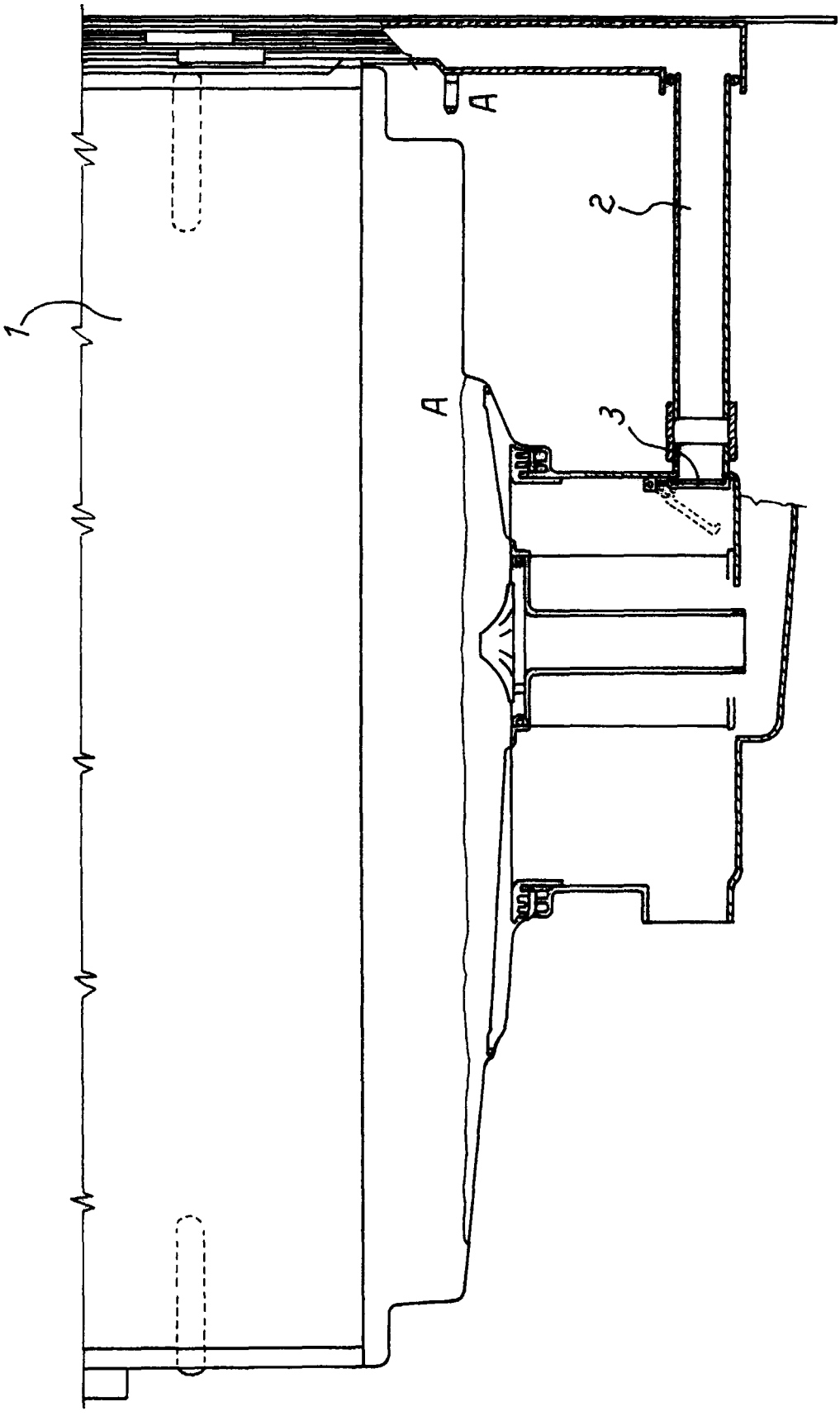
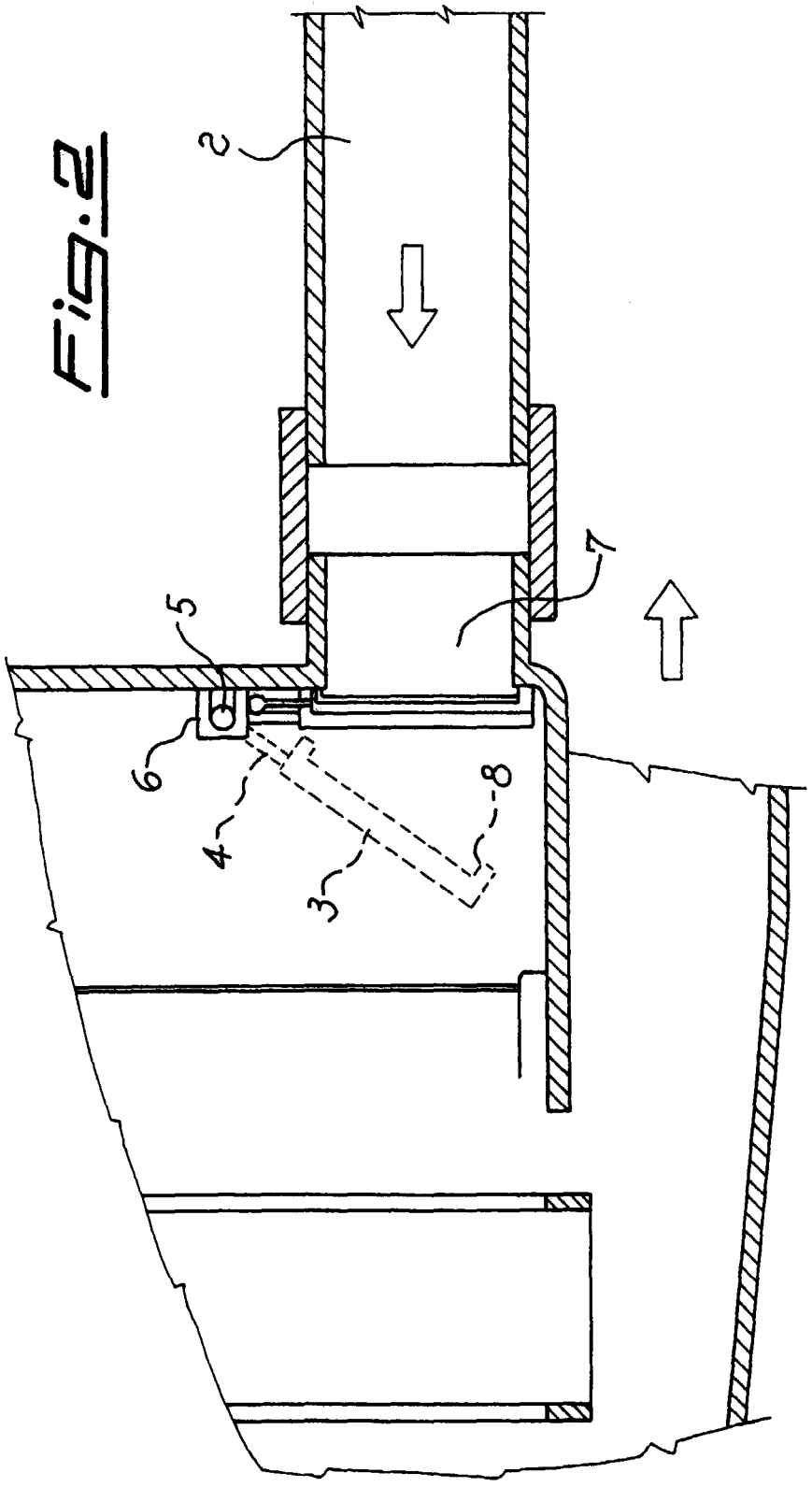


Fig.1

Fig.2



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EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0356

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.7)
P,X	EP 0 962 182 A (T & P S P A) 8 December 1999 (1999-12-08) * the whole document *	1-6	A47L15/42
X	CH 315 864 A (VERZINKEREI ZUG AG) 31 October 1956 (1956-10-31) * the whole document *	1-6	
A	DE 38 33 800 A (LICENTIA GMBH) 12 April 1990 (1990-04-12) * the whole document *	1-6	
A	DE 195 46 967 A (BOSCH SIEMENS HAUSGERAETE) 19 June 1997 (1997-06-19) * abstract *	1-6	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A47L
D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 September 2000	Norman, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 83 0356

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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20-09-2000

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82