(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 963 732 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.12.1999 Bulletin 1999/50

(51) Int. Cl.[6]: **A47L 15/42**

(21) Application number: **99108182.9**

(22) Date of filing: **26.04.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **10.06.1998 IT PN980033 U**

(71) Applicant:
Electrolux Zanussi S.p.A.
33170 Pordenone (IT)

(72) Inventor: **Favret, Ugo**
33072 Casarsa, Pordenone (IT)

(74) Representative:
Busca, Luciano et al
PROPRIA S.r.l.
Via Mazzini 13
33170 Pordenone (IT)

(54) Dishwashing machine with improved filtering means

(57) A bell-shaped trap (18) is provided upstream of the recirculation filter (12) with its open base (20) situated at a level (B) which is lower than the dynamic level (D) reached by the water in the sump (8) when a washing, ie.recirculating pump (10) is operating. The base of said bell-shaped element forms with said filter (12) a hollow space (19) communicating with the drain (5-7), wherein said bell-shaped element (18) substantially retains the soil particles (16, 17) suspended in the water and prevents the so trapped particles from being subsequently sucked in through the filter (12) with the flow of water brought about by the pump (10).

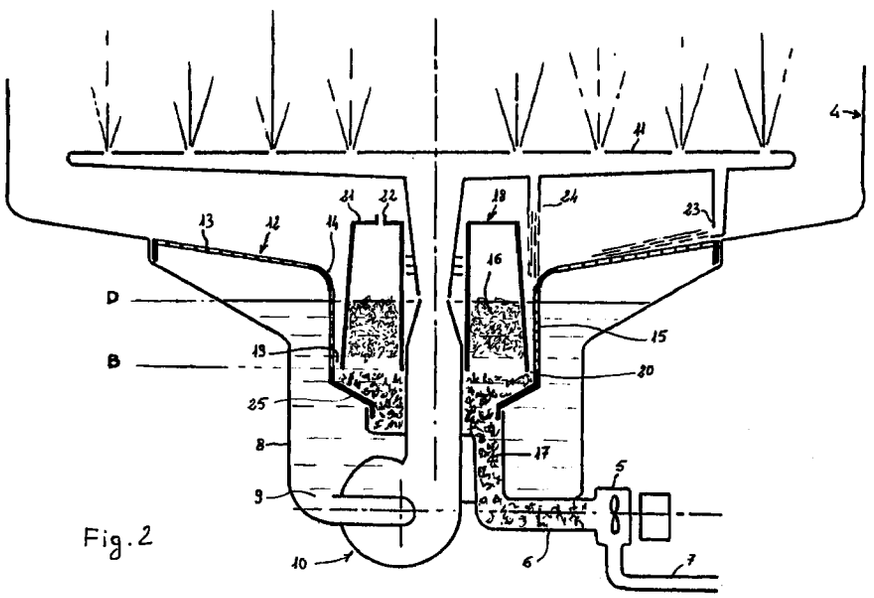

Fig. 2

EP 0 963 732 A1

Description

[0001] Dishwashing machines are known to usually comprise a recirculation filter arranged in the path of a flow of water that is taken in by a recirculating pump to therewith supply washload spraying means.

[0002] As described for instance in GB-B-2 225 224, such a filter includes a substantially frusto-conical portion with an aperture connecting the interior of the washing vessel with the intake of a draining pump. The filter also comprises a substantially cylindrical or frusto-conical portion that extends downwards from said aperture.

[0003] When the recirculating pump is operating (for instance during a washing phase), the level of the water on the bottom of the washing vessel is generally known to lower from a "static" value to a "dynamic" value, whereas it rises again to its above mentioned static value when the recirculating pump is de-energized, ie. does not operate, such as this occurs for instance during the pauses that may be provided during the washing phase.

[0004] During washing, heavier dirt particles contained in the water tend to deposit onto the bottom of the washing vessel, near the intake of the draining pump, from where they are then drained off. On the other hand, during the above mentioned pauses, the relatively light soil particles that are in suspension in the same water (the level of which is rising on the bottom of the washing vessel) tend to float and mount to said static level, so that they are anew affected by the intake action of the recirculating pump in a subsequent operating phase. This of course reduces the efficiency of the filtering system of the machine and indesirably impairs the performance of the dishwasher.

[0005] A dishwasher is known from the German utility model application no. G 295 18 990.8, whose washing vessel is provided on the bottom with a float-type non-return valve adapted to prevent the washing circuit of the machine from being affected by the soiled water flowing back from the draining circuit at the end of a draining phase.

[0006] Such a solution, although clearly advantageous, is by no means effective in solving the above cited problem due to the lighter soil particles suspended in the wash water. Furthermore, it anyway indesirably calls for the use of a float-type moving member that proves quite critical in the operation thereof.

[0007] It is a main purpose of the present invention to provide a dishwashing machine provided with filtering means that are simple, reliable and capable of ensuring an improved soil filtering action, with particular reference to the lighter soil particles suspended in the water flowing through the washing circuit of the machine.

[0008] According to the present invention, this aim is reached in a dishwashing machine with improved filtering means embodying the features as recited in the appended claims.

[0009] Anyway, characteristics and advantages of the present invention will become more readily apparent from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figures 1 to 3 are partial and schematical views of a preferred embodiment of the dishwashing machine according to the present invention in respective operating conditions thereof.

[0010] Referring to the above cited Figures, the dishwashing machine can be noticed to be provided with a washing vessel 4 (shown only partially) associated to a draining circuit comprising mainly a draining pump 5 with therewith associated intake pipe 6 and delivery pipe 7.

[0011] The vessel 4 is provided at its lower portion with a sump 8 for collecting the wash and rinse water, wherein the intake section 9 of a washing or recirculating pump 10 communicates with the bottom of said sump. Said recirculating pump is in turn adapted to supply at least a rotating spray arm 11, or similar means, to cause the washload to be thereby sprayed in a per sè known manner.

[0012] Below said rotating spray arm 11 said vessel 4 also houses a recirculation filter 12 arranged in the path of a flow of water that is taken in by the pump 10 to be then sprayed onto the washload items through the rotating spray arm 11, when said water collects then again by gravity into the sump 8.

[0013] In the described example, the filter 12 comprises a substantially plane portion (which preferably is slightly frusto-conical in its shape) having a ring 14 through which it blends into a substantially cylindrical (or frusto-conical) portion 15 that extends downwards until it reaches a wall 25. The latter is arranged to flow into the intake pipe 6 of the draining pump 5.

[0014] In a preferred manner, the portions 13 and 15 of the recirculation filter are substantially concentric to the axis of rotation of the rotating spray arm 11, while a coarse-meshed filter (not shown for reasons of greater simplicity) is arranged inside said cylindrical portion 15 to protect the draining pump.

[0015] In a per sè known manner, the washing vessel 4 is adapted to be supplied with water that collects into the sump 8 up to a static level S (Figure 1) that it reaches when the recirculating pump 10 is not operating.

[0016] When the pump 10 is on the contrary operating so as to carry out, say, a washing phase, the water in the sump 8 is taken in by the same pump 10 so as to be then able to be sprayed on to the wasload items, through the rotating spray arm 11, thereby removing both relatively light soil particles 16 and relatively heavy soil particles 17 therefrom. As a result, the level of the water in the sump 8 decreases to a dynamic value D, as shown in Figure 2.

[0017] In a preferred manner, the dishwashing machine is of the type adapted to carry out washing phases through a sequence of interrupted operations of the pump 10, such as described for instance in EP-B-0 237 994 or EP-A-0 659 381.

[0018] In any case, according to the present invention the dishwashing machine comprises trap-like means 18 adapted to substantially retain the soil particles suspended in the water and to prevent the so trapped soil particles from being again taken in, ie. flushed by the flow of water that passes through the recirculation filter 12.

[0019] In a preferred manner, said trap-like means 18 comprise at least a substantially bell-shaped element that is arranged upstream of the filter 12, with which they form at least a hollow space 19 communicating with the draining circuit 6, 7. Furthermore, said bell-shaped element 18 has an open base 20 situated at a level B which is lower than said dynamic level D (Figure 2), as well as a substantially closed top portion 21 that is preferably situated at a level that is higher than said static level S. The bell-shaped element 18 is also provided with venting means 22 that are preferably arranged in correspondence of said top portion 21 and are situated at a higher level than said static level S.

[0020] In a preferred manner, the rotating spray arm 11 is provided with auxiliary nozzles 23 and 24 which, when the recirculating pump 10 is operating, are adapted to direct onto the portions 13 and 15 of the filter respective tangential water jets adapted to perform an automatic cleaning of said filter, as this is for instance described in GB-B-2 204 482.

[0021] During a washing phase, when the pump 10 is operated in order to spray the washload items, the level of the water in the sump 8 lowers from the initial static value S shown in Figure 1 to the dynamic value D shown in Figure 2, as set forth earlier in this description. In particular, the pump 10 takes in a flow of water that, starting from the vessel 4, passes through the recirculation filter 12 and is delivered to the rotating spray arm 11. The soil particles 16 and 17 removed from the washload items are brought into a suspended state in the water that flows to collect again into the sump 8, and are filtered out by the filter 12.

[0022] Substantially, said particles (especially the heavier particles 17) tend to fall to the bottom, towards the pipe 6 of the draining pump 5, by passing through the hollow space 19 within the cylindrical portion 15 of the filter. This is also due to the action of the water jet issued by the auxiliary nozzle 24. Anyway, owing also to the turbulence of the water in the sump 8, a part of the soil particles (especially the lighter particles 16) tend then to remain in suspension in the water so collected in the sump 8, downstream of the hollow space 19.

[0023] Such an occurrence takes place in a particularly accentuated form during a subsequent pause in the operation of the recirculating pump 10, in which the whole amount of water contained in the vessel 4 collects into the sump 8, where it then tends to rapidly use again to the static level S. As illustrated in Figure 3, in fact, a part of the soil particles 16, 17 tend to "float" in the water collecting sump 8.

[0024] According to the present invention, anyway, said floating soil particles are substantially trapped, downstream of the hollow space 19, in the upper inner portion of the bell-shaped element 18, in which the water is able to freely rise again up to the static level S thanks to the presence of the vent 22.

[0025] It is of course mainly the lighter soil particles 16 that remain trapped in the element 18, whereas the heavier soil particles 17 tend to collect on the bottom, towards the draining circuit.

[0026] As a result, in a subsequent phase of operation of the recirculating pump 10, the water being taken in by said pump 10 through the filter 12 does substantially not involve the floating soil particles trapped inside the bell-shaped element 18.

[0027] In an advantageous manner, therefore, the soil particles trapped in the element 18 does no longer have to be filtered by the filter 12, whose effectiveness and cleanliness are in this manner substantially improved. This of course translates into a corresponding improvement in the performance of the whole dishwashing machine.

[0028] It should furthermore be noticed that the dishwashing machine according to the present invention does not require any additional moving member in contact with the soil, such as for instance a valve, so that the dishwashing machine itself proves also particularly reliable in the course of the time.

[0029] The operation cycle of the machine terminates of course with a usual phase of operation of the drain pump 5, so that all soil particles 16, 17 are drained off through the pipe 7 along with the water contained in the washing vessel 4.

[0030] It will be appreciated that the afore described dishwashing machine may be the subject of a number of modifications without departing from the scope of the present invention. So, for instance, the conformation and/or the arrangement of the recirculating filter 12 may be varied to better comply with differing requirements and needs.

Claims

1. Dishwashing machine comprising a washing vessel associated to a drain circuit and provided with at least a recirculating filter arranged in the path of a flow of water taken in by a recirculation pump adapted to supply washload spraying means to remove relatively light soil particles and relatively heavy soil particles from said washload, said water collecting on the bottom of said vessel up to a level adapted to change from an upper static value and a lower dynamic value, and vice-versa, when said recirculation pump is substantially operating and

de-energized, respectively, **characterized in that** it further comprises trap means (18) adapted to substantially retain the soil particles (16, 17) that are in suspension in the water, and to prevent such trapped particles from being taken in and re-introduced in said flow of water through the recirculating filter (12).

2. Dishwashing machine according in claim 1, **characterized in that** said trap means (18) are arranged upstream of the recirculating filter (12), with which they form at least a hollow space (19) communicating with said drain circuit (5-7).

3. Dishwashing machine according to claim 2, **characterized in that** trap means (18) comprise at least a substantially bell-shaped element having an open base (20) situated at a level (B) that is lower than said dynamic level (D).

4. Dishwashing machine according to claim 3, **characterized in that** said bell-shaped element (18) comprises a substantially closed top portion (21) situated at a level that is higher than said static level (S).

5. Dishwashing machine according to claim 3, **characterized in that** said bell-shaped element (18) comprises venting means (22) situated at a level which is higher than said static level (S).

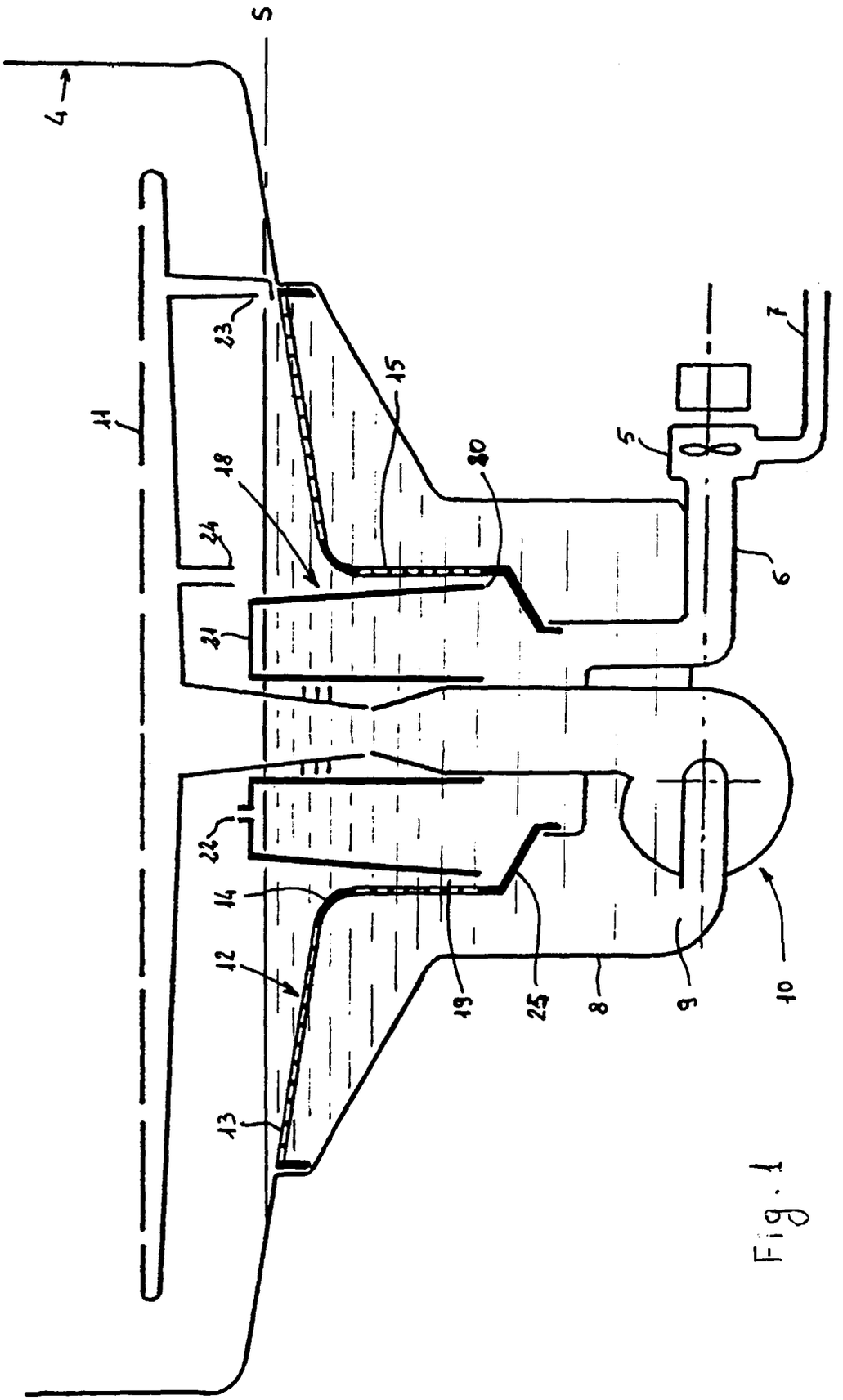

Fig. 1

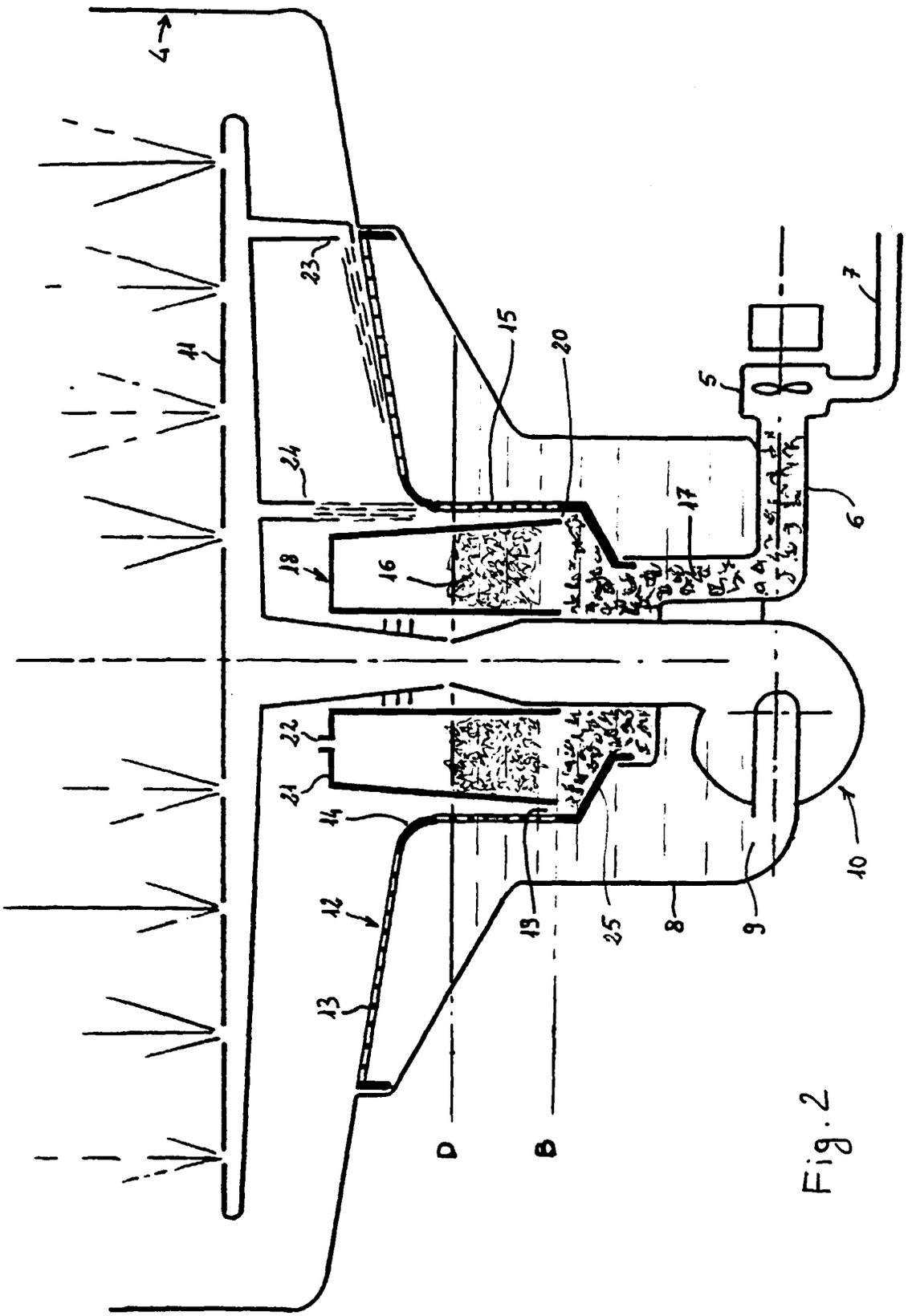

Fig. 2

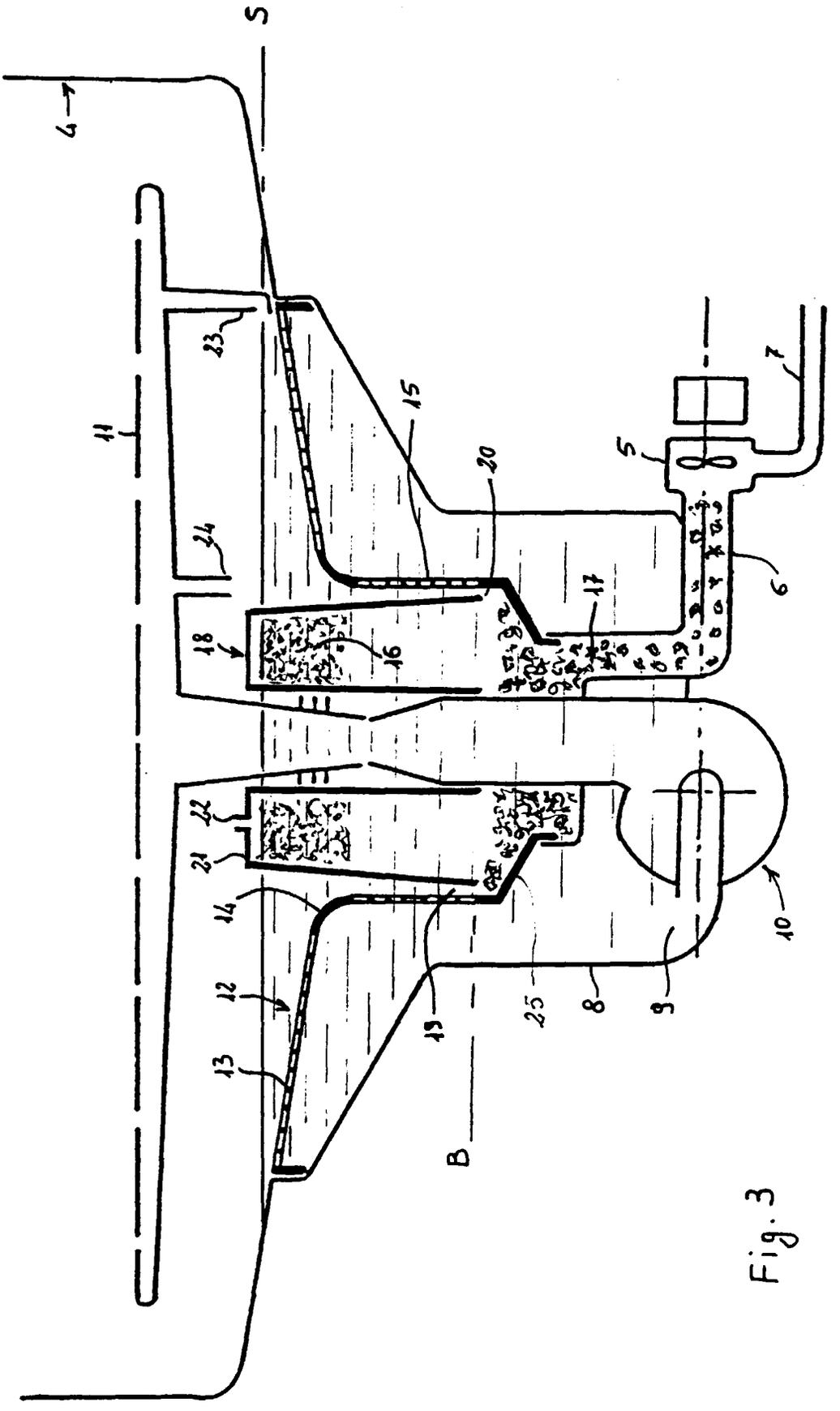

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 8182

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)
X	FR 2 378 493 A (LICENTIA GMBH) 25 August 1978 (1978-08-25)	1-3	A47L15/42
Y	* the whole document *	5	
Y	EP 0 546 922 B (ESSWEIN SA) 23 April 1997 (1997-04-23) * claim 1; figures *	5	
A	GB 2 254 542 A (ZANUSSI ELETTRODOMESTICI) 14 October 1992 (1992-10-14)		
A,D	GB 2 204 482 A (ZANUSSI A SPA INDUSTRIE) 16 November 1988 (1988-11-16)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23 September 1999	Debard, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 10 8182

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-09-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2378493 A	25-08-1978	DE 2703434 A	03-08-1978
		ES 466400 A	01-10-1978
		IT 1092326 B	06-07-1985
EP 0546922 B	16-06-1993	FR 2684538 A	11-06-1993
		DE 69219295 D	28-05-1997
		DE 69219295 T	07-08-1997
		EP 0546922 A	16-06-1993
		ES 2100321 T	16-06-1997
GB 2254542 A	14-10-1992	IT PN910010 U	08-10-1992
		DE 9204727 U	25-06-1992
		FR 2674740 A	09-10-1992
GB 2204482 A	16-11-1988	IT 211726 Z	07-04-1989
		DE 8802328 U	11-08-1988
		FR 2613609 A	14-10-1988

EPO FORM P0459

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