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(54) **Method for cleaning the filter of a dishwasher and dishwasher for carrying out the same**

(57) Method for cleaning a filter of a dishwashing machine comprising a washing vessel (2) adapted to accommodate the tableware items to be washed, a collecting sump (3) provided at the bottom of the washing vessel (2) and adapted to be filled with water, a circulation pump (4) and a drain pump (5), both of them fluidly connected to the collecting sump (3), and at least one filter (6) arranged in the collecting sump (3) for filtering the water

being circulated and let off by said pumps, wherein the method includes the steps of:

- energizing heating means (7), when the collecting sump (3) is in an empty condition, so as to overheat said filter (6) in view of having the organic material settled on and retained by the same filter burnt and reduced to ashes;
- de-energizing said heating means (7) after a pre-set period of time.

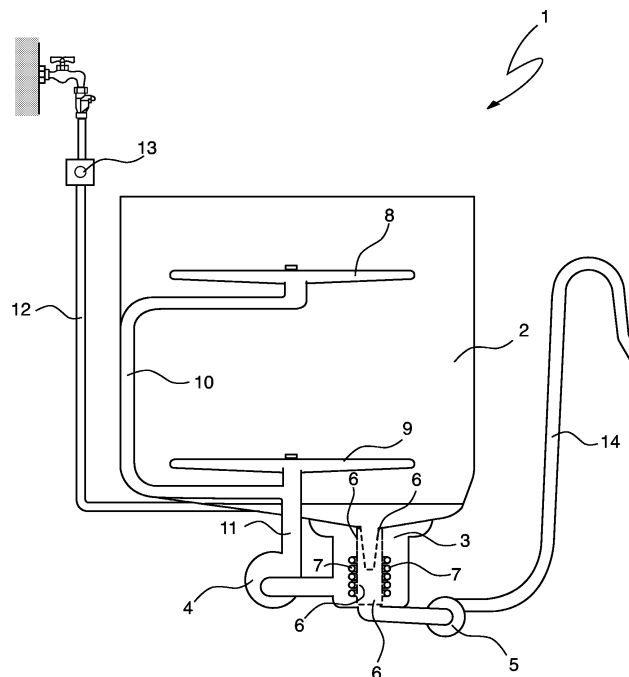


FIG. 1

Description

[0001] The present invention refers to a method for cleaning the filter in a dishwasher, as well as a dishwasher for carrying out such method.

[0002] It is generally known that, during the operation of dishwashing machines, solid particles of organic material removed from the tableware items being washed tend to accumulate in the dishwasher filter until eventually clogging it.

[0003] Such clogged condition of the dishwasher filter has the effect of preventing water from being duly circulated during washing and rinsing of the tableware items, as well as from being regularly let off at the end of the washing process. As it can be readily appreciated, this causes the cleaning effectiveness of the dishwashing machine to suffer a setback.

[0004] As a result, after a dishwasher has performed a few washing cycles, the user is forced to arrange for the filter of the machine to be duly cleaned in view of restoring the same machine to full operating efficiency.

[0005] Such cleaning of the dishwasher filter requires a user to remove the filter from a proper accommodation thereof provided in the dishwasher, and then clean it by removing the solid organic material settled thereon directly with the hands or with the use of some appropriate tool.

[0006] Now, as it can be readily appreciated, such operation is a rather time-consuming and unpleasant one for a user to carry out.

[0007] It is therefore a main object of the present invention to provide a method for cleaning the filter of a dishwashing machine, as well as a dishwasher adapted to carry out such method, which are effective in doing away with the above-cited drawback of prior-art machines.

[0008] Within this general object, it is a further purpose of the present invention to provide a method for, as well as a dishwasher capable of automatically performing a filter self-cleaning cycle, thereby doing away with the need for the user to have to step in manually in the process of physically cleaning the same filter.

[0009] According to the present invention, these aims, along with further ones that will become apparent from the following disclosure, are reached in a method for cleaning the filter of a dishwashing machine, as well as in a dishwashing machine adapted to carry out such method, incorporating the features as defined and recited in the claims appended hereto.

[0010] Features and advantages of the present invention will anyway be more readily understood from the description that is given below by way of nonlimiting example with reference to the accompanying drawings, in which:

- Figure 1 is a cross-sectional view of a dishwashing machine according to the present invention, showing in particular the phase in which the heating means

operate to overheat the filter within the water-free, i.e. empty collecting sump of the machine, so as to have the organic material settled on the filter reduced to ashes;

- Figure 2 is a similar view as the one appearing in Figure 1, showing in particular the flow of water being rushed through the collecting sump so as to flush the ashes of the organic material off the filter.

[0011] According to the present invention, and with reference to the above-cited Figures, the method for cleaning the filter of a dishwashing machine comprising a washing vessel 2 adapted to accommodate the tableware items to be washed, a collecting sump 3 provided at the bottom of the washing vessel 2 and adapted to be filled with water, a washing or circulation pump 4 and a drain pump 5, both of them fluidly connected to the collecting sump 3, and at least one filter 6 arranged in the collecting sump 3 for filtering the water being circulated and let off by said pumps, includes the steps of:

- energizing heating means 7, when the collecting sump 3 is free of water, i.e. in an empty condition, so as to overheat said filter 6 in view of having the organic material settled on the same filter burnt and reduced to ashes;
- de-energizing said heating means 7 after a pre-set period of time.

[0012] The dishwashing machine adapted to carry out the above-cited method - as generally indicated at 1 in the Figures - is provided with top and bottom rotating spray arms 8, 9, connected via respective water delivery ducts 10, 11 to the circulation pump 4, for washing the tableware items.

[0013] The washing vessel 2 is adapted to receive water being let into it from the water supply line via a proper water-supply duct 12. Wherein an electromagnetic valve 13 is provided to control the inflow of the water from the water supply line, so as to enable pre-established amounts of water to be each time filled into the sump 3.

[0014] The dishwashing machine further comprises heating means 7 provided to overheat the filter when the collecting sump 3 is empty, i.e. has no water inside it.

[0015] These heating means 7 are adapted to heat the filter up to such a temperature as to cause the organic material retained in the filter to be burnt and reduced to ashes.

[0016] In a first embodiment thereof, said heating means 7 are adapted to overheat the filter 6 by radiation.

[0017] In an advantageous manner, the filter 6 may further be made of a heat-conductive material so as to enhance both the heat efficiency and the effectiveness in overheating the filter 6, thereby enabling the organic material to be reduced to ashes in a very quick manner.

[0018] In particular, the heating means 7 may comprise one or several electric heating elements of the sheathed

type, duly arranged in the collecting sump close to the filter to be overheated. These same sheathed-type heating elements are also used to heat up the washing and rinsing water circulated in the washing vessel through the rotating spray arms 8, 9, and through the collecting sump 3.

[0019] As an alternative thereto, the heating means 7 may comprise at least one infrared heater arranged in the collecting sump and adapted to overheat the filter 6 so as to have the organic material settled on the filter 6 duly reduced to ashes. In this case, such infrared heater would solely be used to filter cleaning purposes, so that additional heating elements are provided to heat up the washing and rinsing water circulated in the machine.

[0020] In a second embodiment thereof, the heating means 7 are arranged in contact with a filter 6 made of a heat-conductive material, so that the same filter is heated by the heating means by conduction.

[0021] In this second embodiment of the heating means, the latter may be comprised of at least an annular sheathed-type heating element coiled into a plurality of turns round the outer surface of a filter provided in the form of a perforated cylindrical body made of heat-conductive material, as illustrated by way of example in Figure 1.

[0022] As an alternative thereto, the heating means 7 may be provided in the form of a film heater applied on to a heat-conductive, perforated support acting as the filter. This film heater may for instance be made of an insulated steel plate with a resistor applied to it according to known film technology.

[0023] Such heating means 7 may be either specially provided to solely heat up the filter 6 or be provided so as to be also used - at least partially and in at least some of the phases of the washing cycle - to heat up the water circulated in the washing vessel 2 through the rotating spray arms 8, 9, and through the collecting sump 3 during the regular operation of the dishwashing machine.

[0024] The method according to the present invention calls therefore for the heating means to be energized and operated when the collecting sump 3 is empty, i.e. when there is no water in it. Under these conditions, the heating means 7 heat up the filter to a temperature at which the organic residues settled on the same filter during the previous washing cycles performed by the machine are eventually burnt and reduced to ashes.

[0025] After a pre-set period of time, as needed to allow the organic material to be completely reduced to ashes, the heating means are then de-energized.

[0026] As a result the filter 6 is duly cleaned and the risk of clogging is totally eliminated. Further, all the unpleasant odours produced by the organic material settled on the filter 6 are completely eliminated as well.

[0027] Preferably, the method, according to the present invention, comprise the step of delivering a pre-established amount of water into the collecting sump 3, and operating the drain pump 5 in view of causing said water to rush through the collecting sump 3 so as to flush

the filter 6 and remove the ashes of the burnt organic material off the same filter.

[0028] In fact, such sudden flow of water flushes the burnt organic material off the filter and carries it towards the drain pump, from which it is eventually eliminated from the machine through the drain pipe 14.

[0029] In other word, after the heating means are de-energized, a pre-established amount of water is caused to rush into and through the collecting sump 3, so as to have it flush the filter 6; the drain pump 5 is at the same time operated so as to let off this amount of water, along with the ashes it has flushed off the filter, as this is shown schematically in Figure 2.

[0030] Alternatively, the ashes of the burnt organic material can be removed from the filter 6 by means of the water flow, which occur during normal pre-washing or washing phase of the washing cycle.

[0031] In practice, the dishwashing machine is provided with a filter self-cleaning feature, which can be selected through the actuation of proper input and setting controls that may for instance be provided on the front panel of the dishwasher machine.

[0032] Once this filter self-cleaning feature is so selected by the user, the dishwashing machine will then automatically activate - through proper control means - a specially designed programme that carries out the filter cleaning method according to the present invention.

[0033] Such filter self-cleaning feature is fully independent of and separate from the various washing cycles and programmes that the machine is capable of carrying out.

[0034] In an advantageous manner, this filter self-cleaning feature may be provided as to be able to be performed automatically by the dishwashing machine after a pre-determined number of washing cycles completed by it. As an alternative thereto, the dishwashing machine may be provided so as to warn the user - through proper light or sound indicating means - that the filter self-cleaning feature needs to be activated, wherein this may for instance occur on the basis of the number of washing cycles that have been carried out by the same machine.

[0035] According to the present invention, the filter self-cleaning feature may also be provided to be carried out in an alternative method, in which the filter is overheated by convection by the heated-up water filling the collecting sump 3.

[0036] Such alternative method for cleaning the filter of a dishwashing machine comprising a washing vessel 2 adapted to accommodate the tableware items to be washed, a collecting sump 3 provided at the bottom of the washing vessel 2 and adapted to be filled with water, a washing or circulation pump 4 and a drain pump 5, both of them fluidly connected to the collecting sump 3, and at least one filter 6 arranged in the collecting sump 3 for filtering the water being circulated and let off by said pumps, respectively, includes the steps of:

- filling a pre-established amount of water into the col-

lecting sump 3 so as to submerge said filter 6, while the circulation pump 4 and the drain pump 5 are de-energized;

- energizing heating means 7 for heating up the water filled in the collecting sump 3, in view of causing this water to in turn heat up the filter and soften the organic material settled thereonto, the circulation pump 4 and the drain pump 5 being still de-energized;
- de-energizing said heating means 7 after a pre-set period of time;
- operating the drain pump 5 to let off the pre-established amount of water contained in the collecting sump 3 and remove the softened organic material from the filter.

[0037] In fact, once that the organic material retained in the filter from previously performed washing cycles of the machine is softened by the hot water, the flow of water created by the drain pump 5 being so energized and operated is therefore able to flush the filter and remove the softened organic material therefrom for it to be eventually let off the machine via the drain pipe.

[0038] The heating means 7 are arranged in the collecting sump 3 and they may be provided to either heat up the water in the collecting sump 3 to the sole purpose of carrying out the filter self-cleaning feature of the filter 6 or they can be used to also heat up the water circulating in the collecting sump 3 during the different washing cycles that can be selected for the dishwashing machine to perform.

[0039] As already indicated in connection with the first method, even in the case of this alternative method, in which the filter is heated by convection, the filter self-cleaning feature may be selected by correspondingly actuating appropriate input and setting controls that may for instance be provided on the front panel of the dishwashing machine.

[0040] Once this filter self-cleaning feature is so selected by the user, the dishwashing machine will then automatically activate - through proper control means - a specially designed programme that carries out this alternative filter cleaning method according to the present invention.

[0041] Again, such filter self-cleaning feature is fully independent of and separate from the various washing cycles that the machine is programmed to carry out.

[0042] In an advantageous manner, this filter self-cleaning feature may be provided as to be able to be performed automatically by the dishwashing machine after a pre-determined number of washing cycles completed by it. As an alternative thereto, the dishwashing machine may be provided so as to warn the user - through proper light or sound indicating means - that the filter self-cleaning feature needs to be activated, wherein this may for instance occur on the basis of the number of washing cycles that have been carried out by the same machine.

[0043] The above-described filter cleaning methods

can of course be carried out even with the tableware items already loaded in the washing vessel of the machine waiting for the actual washing cycle to be started.

[0044] Fully apparent from the above description is therefore the ability of the the present invention to effectively reach the afore-cited aims and advantages by providing a method for cleaning the filter of a dishwashing machine, as well as a dishwashing machine adapted to carry out such method, which enable the filter to be cleaned in an effective, quick manner, while doing away with the need for a user to carry out such cleaning manually.

15 Claims

1. Method for cleaning a filter of a dishwashing machine comprising a washing vessel (2) adapted to accommodate the tableware items to be washed, a collecting sump (3) provided at the bottom of the washing vessel (2) and adapted to be filled with water, a circulation pump (4) and a drain pump (5), both of them fluidly connected to the collecting sump (3), and at least one filter (6) arranged in the collecting sump (3) for filtering the water being circulated and let off by said pumps, **characterized in that** it includes the steps of:

- energizing heating means (7), when the collecting sump (3) is in an empty condition, so as to overheat said filter (6) in view of having the organic material settled on and retained by the same filter burnt and reduced to ashes;
- de-energizing said heating means (7) after a pre-set period of time.

2. Method according to claim 1, further comprising the steps of:

- delivering a pre-established amount of water into the collecting sump (3), and operating the drain pump (5) in view of causing said water to rush through the collecting sump (3) so as to flush the filter (6) and remove the ashes of the burnt organic material off the same filter.

3. Dishwashing machine for carrying out the method according to claim 1 or 2, **characterized in that** it comprises heating means (7) adapted to overheat the filter (6) by radiation, in order to burn and reduce to ashes the organic material being retained in the filter.

4. Dishwashing machine according to claim 3, wherein said filter (6) is made of heat-conductive material.

5. Dishwashing machine according to claim 3, wherein said heating means (7) comprise at least an infrared

heater arranged in the collecting sump (3).

6. Dishwashing machine for carrying out the method according to claim 1, **characterized in that** it comprises heating means (7) arranged in contact with a filter (6) made of heat-conductive material, so as to overheat said filter by conduction in order to burn and reduce to ashes the organic material being retained in the filter. 5
- 10
7. Method for cleaning a filter of a dishwashing machine comprising a washing vessel (2) adapted to accommodate the tableware items to be washed, a collecting sump (3) provided at the bottom of the washing vessel (2) and adapted to be filled with water, a circulation pump (4) and a drain pump (5), both of them fluidly connected to the collecting sump (3), and at least one filter (6) arranged in the collecting sump (3) for filtering the water being circulated and let off by said pumps, **characterized in that** it includes the steps of: 15
- filling a pre-established amount of water into the collecting sump (3) so as to submerge said filter (6), while the circulation pump (4) and the drain pump (5) are de-energized; 25
 - energizing heating means (7) to heat up the water filled in the collecting sump (3), in view of causing this water to in turn overheat said filter (6) by convection and soften the organic material settled thereonto, the circulation pump (4) and the drain pump (5) being still de-energized; 30
 - de-energizing said heating means (7) after a pre-set period of time;
 - operating the drain pump (5) to let off the water contained in the collecting sump (3) and remove the softened organic material from the filter. 35

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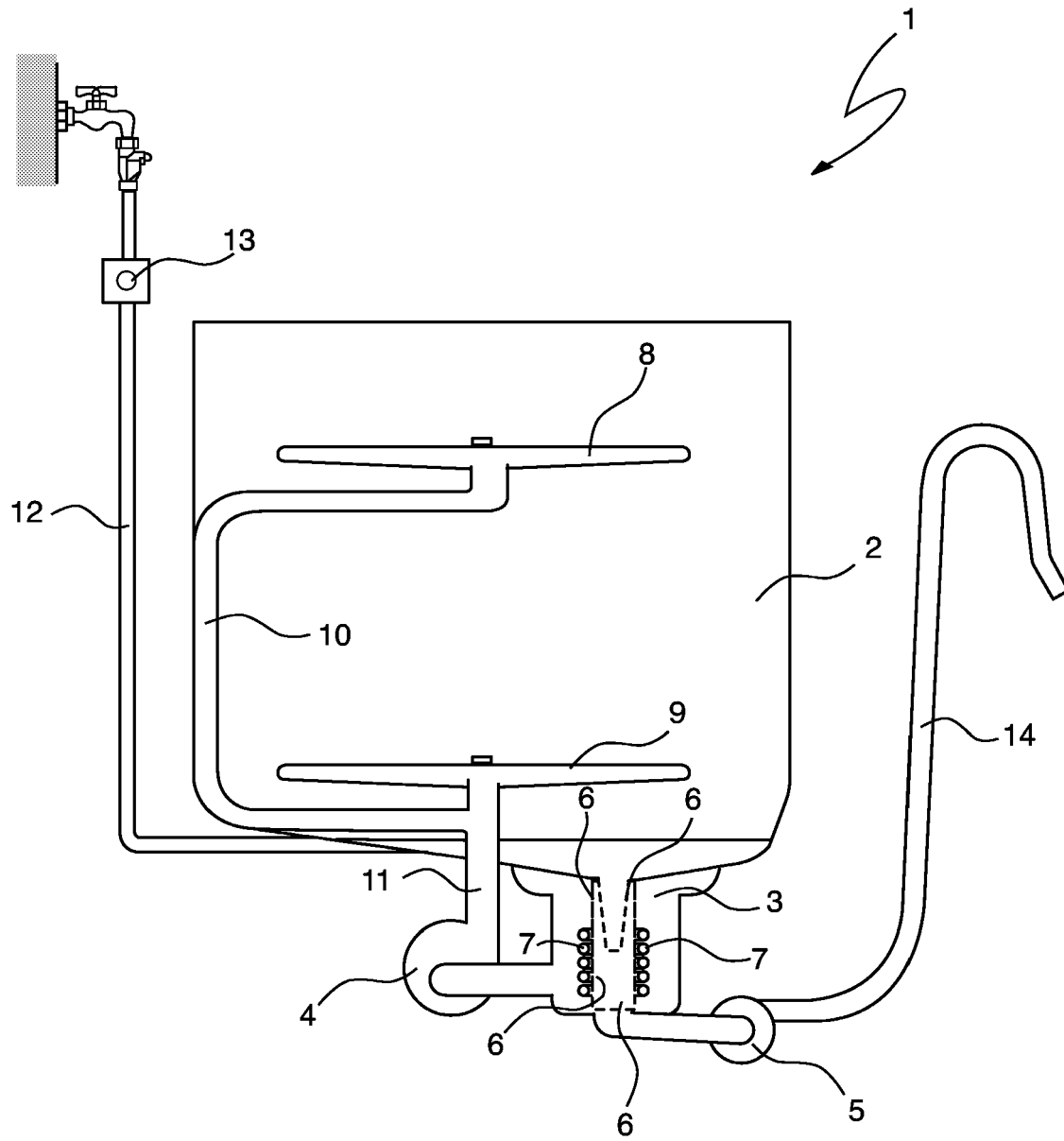


FIG. 1

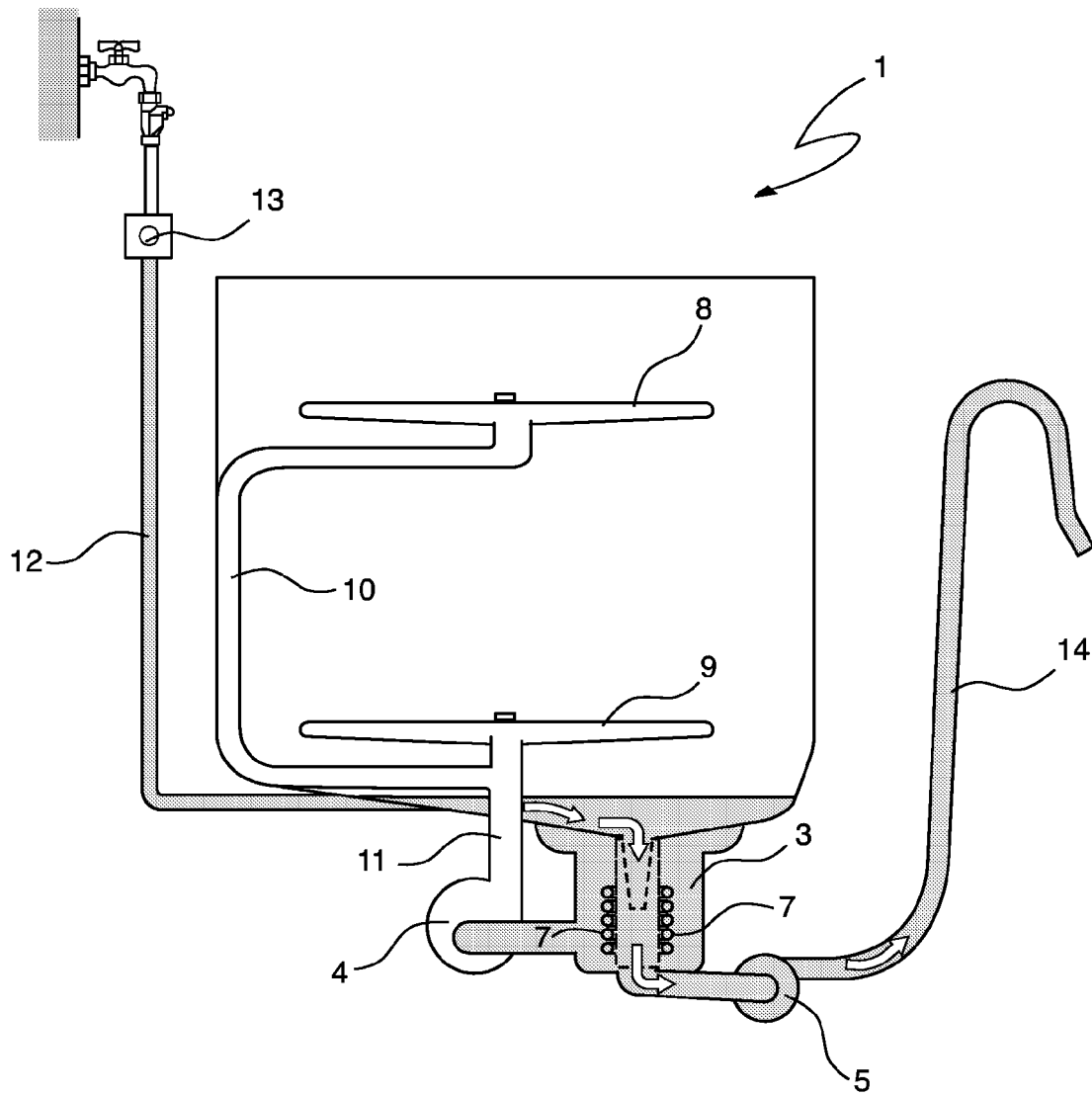


FIG. 2

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 199 51 838 A1 (AEG HAUSGERAETE GMBH [DE]) 10 May 2001 (2001-05-10)	3-5	INV. A47L15/42
Y	* the whole document *	6	
A	-----	1	
X	EP 1 224 902 A2 (CANDY SPA [IT]) 24 July 2002 (2002-07-24)	3-5	
A	* the whole document *	1	
Y	DE 36 35 778 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 28 April 1988 (1988-04-28)	6	TECHNICAL FIELDS SEARCHED (IPC) A47L
A	* column 3, line 15 - column 4, line 26 * * figures 1-8 *	1,3	
A	DE 14 28 358 A1 (BRAUN AG) 14 November 1968 (1968-11-14) * page 1, line 1 - line 6 * * page 2, line 3 - line 27 * * page 4, line 21 - page 7, line 21 * * figures 1-6 *	1,3	
A	DE 37 23 721 A1 (CANDY ELETTRDOMESTICI [IT]) 26 May 1988 (1988-05-26) * abstract * * figures 1-5 *	1	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 October 2006	Examiner REDELSPERGER, C
CATEGORY OF CITED DOCUMENTS		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	
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			

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-6



European Patent
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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 06 11 4728

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-6

A dishwasher and A method for cleaning a filter of a dishwasher by overheating the filter when the sump is in an empty condition in order to burn and reduce to ashes the organic material being retained in the filter.

2. claim: 7

A method for cleaning a filter of a dishwashing machine when the sump is filled with water, thereby overflowing the filter, softening the organic material with heated water and removing said organic material by operating the drain pump.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 11 4728

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.

30-10-2006

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