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

(11) EP 3 026 166 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.06.2016 Bulletin 2016/22

(51) Int Cl.:
D06F 39/08 *(2006.01)* ***D06F 39/10*** *(2006.01)*

(21) Application number: **15196023.4**

(22) Date of filing: **24.11.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **27.11.2014 CN 201410706798**

(71) Applicant: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventors:
- **Eisert, Horst**
  97297 Waldbuettelbrunn (DE)
- **Li, Zhengwei**
  210000 Nanjing (CN)
- **Wang, Lingli**
  210000 Nanjing (CN)
- **Yang, Chengtao**
  210046 Nanjing (CN)

(54) CIRCULATING DRAINAGE APPARATUS AND HOUSEHOLD APPLIANCE

(57) The present invention provides a circulating drainage apparatus comprising a shell (1), the shell (1) being provided with a filter chamber (2), a circulation pump chamber (3), and a drain pump chamber (4), and the filter chamber (2) being provided with a water flow inlet (21), a first outlet (22), and a second outlet (23), wherein the first outlet (22) is in communication with the drain pump chamber (4), and the second outlet (23) is in communication with the circulation pump chamber (3); a circulation drive motor (5), connected to the circulation pump chamber (3); a drain drive motor (6), connected to the drain pump chamber (4); and characterized in that, the filter chamber (2) is provided with a separating wall (71), to separate a space in the filter chamber (2) into a first chamber (24) that connects the water flow inlet (21) and the first outlet (22) and a second chamber (25) connected to the second outlet (23), the separating wall (71) is provided with filter pores, and the first chamber (24) is in fluid communication with the second chamber (25) via the filter pores. In a process of circulating water, a water stream flowing in from outside first enters the first chamber and then passes through the filter pores on the separating wall (71) to enter the second chamber, and after that, the water stream again enters the circulation pump chamber (3) via the second outlet (23). That is, the water stream entering the circulation pump chamber (3) must be first filtered by the separating wall (71), so that foreign substances in the water stream are collected on the separating wall (71). In a process of draining water, an external water stream washes the filtering wall (71) to carry the foreign substances into the drain pump chamber (4), so as to discharge the same from the washing machine, thereby implementing the function of automatically cleaning the separating wall (71). In this way, the user does not need to clean the filtered foreign substances in the circulating drainage apparatus manually.

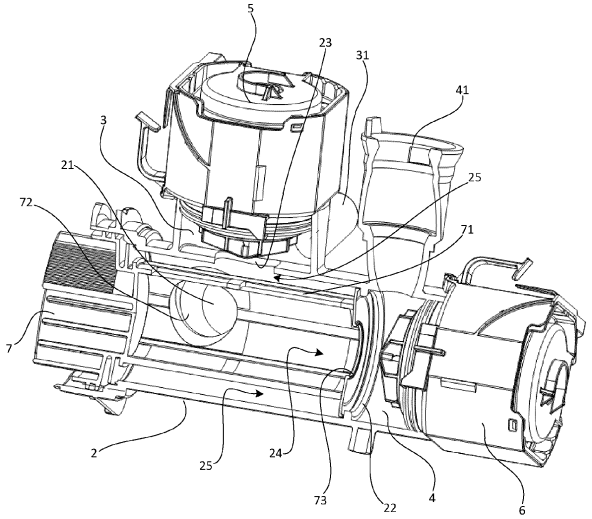

FIG. 4

EP 3 026 166 A1

Description

[0001] The present invention relates to a household appliance that drives water to run, and in particular, to a circulating drainage apparatus in a washing machine or a dish-washing machine.

[0002] Generally, washing machines all adopt an upper draining method. Water in a barrel is discharged from the machine by using a drain pump and a drain pipe. For some washing machines, a bottom of an outer barrel is provided with a circulating water pump, configured to suck water at the bottom of the outer barrel during washing of the washing machine back to an inner barrel. In the existing technology, a drain pump and a circulating water pump are also combined together to form an independent pump having functions of draining water and circulating water. Specifically, details can be referred to the Chinese Utility Model Patent with authorization publication number of CN202559120U. Moreover, the dual-functional pump is further provided with a filter, configured to filter foreign substances from a water stream. The functions of circulating water and draining water of the pump may be influenced when the foreign substances are accumulated to a certain degree in the filter, a user must clean the filter manually, and otherwise performance of the whole washing machine is influenced.

[0003] An objective of the present invention lies in providing a pump device integrated with functions of circulating water and draining water. The pump device can simultaneously have functions of filtering foreign substances and cleaning foreign substances by the device.

[0004] To achieve the above objective, the present invention provides a circulating drainage apparatus, including a shell, the shell being provided with a filter chamber, a circulation pump chamber, and a drain pump chamber, and the filter chamber being provided with a water flow inlet, a first outlet, and a second outlet, where the first outlet is in communication with the drain pump chamber, and the second outlet is in communication with the circulation pump chamber; a circulation drive motor, connected to the circulation pump chamber; a drain drive motor, connected to the drain pump chamber; and characterized in that, the filter chamber is provided with a separating wall, to separate a space in the filter chamber into a first chamber that connects the water flow inlet and the first outlet and a second chamber connected to the second outlet, the separating wall is provided with filter pores, and the first chamber is in fluid communication with the second chamber via the filter pores.

[0005] By providing the separating wall in the filter chamber, the filter chamber is separated into two independent spaces, respectively the first chamber and the second chamber. The drain pump chamber is in communication with the first chamber via the first outlet, and the circulation pump chamber is in communication with the second chamber via the second outlet. In a process of circulating water, a water stream flowing in from outside first enters the first chamber and then passes through the filter pores on the separating wall to enter the second chamber, and after that, the water stream again enters the circulation pump chamber via the second outlet. That is, the water stream entering the circulation pump chamber must be first filtered by the separating wall, so that foreign substances in the water stream are collected on the separating wall. In a process of draining water, an external water stream washes the filtering wall to carry the foreign substances into the drain pump chamber, so as to discharge the same from the washing machine, thereby implementing the function of automatically cleaning the separating wall. In this way, the user does not need to clean the filtered foreign substances in the circulating drainage apparatus manually.

[0006] As a further modification of the present invention, the filter pores of the separating wall are configured to filter out foreign substances from a water stream that flows into the second chamber from the first chamber.

[0007] As a further modification of the present invention, the separating wall winds to form a hollow column structure in the filter chamber, where the first chamber is formed in the column structure; and the column structure is provided with a water inlet in communication with the water flow inlet of the filter chamber and a water outlet in communication with the first outlet of the filter chamber.

[0008] By this setting, the water stream flowing in from the outside passes through the water inlet first enters the first chamber formed in the column structure and then may enter the drain pump chamber via the water outlet in communication with the first outlet of the filter chamber, or enter the second chamber via the filter pore on an outer wall of the column structure.

[0009] As a further modification of the present invention, the water inlet is provided on a side wall of the column structure and the water outlet is provided on the column structure at an end close to the drain pump chamber.

[0010] As a further modification of the present invention, the separating wall is a separator structure, and the first chamber and the second chamber are formed by the separator structure and a wall of the filter chamber, separately.

[0011] The separating wall, presenting the separator structure, is disposed in the filter chamber and separates the filter chamber into two parts, namely, the separator structure and a part of the wall of the filter chamber form the first chamber, and the separator structure and the other part of the wall of the filter chamber form the second chamber. The water stream flowing in from the outside enters the first chamber and then must pass through the filter pores on the separator structure before entering the second chamber.

[0012] As a further modification of the present invention, the separator structure is configured to separate the circulation pump chamber from the drain pump chamber.

[0013] As a further modification of the present invention, a filter having the separating wall is detachably disposed in the filter chamber of the shell.

[0014] In addition, the present invention further provides a household appliance that drives water to move, for example, a washing machine or a dish-washing machine, characterized in that, the household appliance includes the circulating drainage apparatus according to any one of the preceding descriptions.

[0015] Subsequently, the present invention is described in detail by implementing the household appliance that drives water to move as a washing machine as an optimal embodiment. However, this does not indicate that the scope of protection of the present invention is limited to washing machines only.

FIG. 1 is a schematic structural diagram of a washing machine of the present invention;

FIG. 2 is a schematic three-dimensional diagram of a circulating drainage apparatus of the present invention;

FIG. 3 is a schematic three-dimensional diagram of a filter in the circulating drainage apparatus of the present invention; and

FIG. 4 is a vertical plane of a circulating drainage apparatus of the present invention.

Reference signs:

[0016] 100-washing machine; 101-circulating drainage apparatus; 111-outer barrel; 112-inner barrel; 113-drive motor; 114-heating tube; 115-sealing device; 116-wall; 117-mounting hole; 118-controller; 119-drain pipe; 1-shell; 2-filter; 21-water flow inlet; 22-first outlet; 23-second outlet; 24-first chamber; 25-second chamber; 3-circulation pump chamber; 31-circulating water outlet; 4-drain pump chamber; 41-drain outlet; 5-circulation drive motor; 6-drain drive motor; 7-filter; 71-separating wall; 711-reinforcing rib; 712-filter gauze; 72-water inlet; and 73-water outlet.

[0017] A washing machine 100, as shown in FIG. 1, is provided with an outer barrel 111 for containing water. An inner barrel 112 is disposed in the outer barrel 111. The inner barrel 112 may rotate under drive of a drive motor 113, so as to clean clothes received therein. A bottom of the outer barrel 111 is provided with a heating tube 114. The heating tube 114 passes through a sealing device 115 that is made of an elastic material and is disposed in a mounting hole 117 formed on a wall 116 of the outer barrel 111 for containing water via the sealing device 115. The heating tube 114 is electrically connected to the controller 118 and controlled by the controller 118. A circulating drainage apparatus 101 connected to the outer barrel 111 is disposed below the outer barrel 111, and is configured to filter washing water in the washing machine and discharge the washing water from the washing machine to the outside via a drain pipe 119 connected to the circulating drainage apparatus 101. In addition, the circulating drainage apparatus 101 is further configured to suck water at the bottom of the outer barrel 111 that is filtered in the washing process of the washing machine 100 back to the inner barrel 112 via a circulating pipe (not shown).

[0018] As shown in FIG. 2, the circulating drainage apparatus 101 includes a shell 1 that is provided with a filter chamber 2, a circulation pump chamber 3, and a drain pump chamber 4; a circulation drive motor 5 for providing water pumping power for a process of circulating water is connected to the circulation pump chamber 3; a drain drive motor 6 for providing water draining power for a process of draining water is connected to the drain pump chamber 4; and a filter 7 configured to filter out foreign substances from a water stream is detachably disposed in the filter chamber 2. The filter chamber 2 is provided with a water flow inlet 21 for guiding the water stream to flow in. The circulation pump chamber 3 is provided with a circulating water outlet 31 for the circulating water to flow out. The drain pump chamber 4 is provided with a drain outlet 41 for guiding the water stream to be discharged from the washing machine to the outside. When the washing machine 100 performs a washing process, the washing machine 100 controls the circulation drive motor 5 to operate. The washing water at the bottom of the outer barrel 111 is guided in from the water flow inlet 21 and filtered by the filter 7 in the filter chamber 2, then enters the circulation pump chamber 3, and then again sucked back to the inner barrel 112 via the circulating water outlet 31 under drive of the circulation drive motor 5 for participating in the washing process. When the washing machine 100 ends a washing process and needs to drain the washing water, the washing machine 100 controls the drain drive motor 6 to operate. The washing water at the bottom of the outer barrel 111 is guided into the filter chamber 2 from the water flow inlet 21, then directly flows into the drain pump chamber 4, and is discharged from the washing machine 100 to the outside via the drain outlet 41 under drive of the drain drive motor 6. In this way, the same circulating drainage apparatus 101 can separately implement the functions of discharging water and circulating water under different control of the washing machine 100.

[0019] As shown in FIG. 3, the filter 7 disposed in the filter chamber 2 includes a separating wall 71 that extends into the filter chamber 2. The separating wall 71 is majorly composed of a plurality of reinforcing ribs 711 and a filter gauze 712 connected among the respective reinforcing ribs 711. The filter gauze 712 is provided with a plurality of filter pores (not shown) for filtering foreign substances in a water stream. In addition, in this implementation manner, the separating wall 71 is constructed into a hollow column structure. A side wall of the column structure is provided with a water inlet 72 for the water stream to flow into an interior of the hollow column structure, and an end portion of the column structure is provided with a water outlet 73 for the water stream to flow out from the hollow column structure.

[0020] In combination with FIG. 4, the filter chamber 2 is further provided with a first outlet 22 and a second outlet 23. After the filter 7 is disposed in the filter chamber

2, the water inlet 72 of the filter 7 is in communication with the water flow inlet 21 of the filter chamber 2 and the water outlet 73 of the filter 7 is in communication with the first outlet 22 of the filter chamber 2. The column-structured separating wall 71 of the filter 7 separates a space in the filter chamber 2 into a first chamber 24 that connects the water flow inlet 21 and the first outlet 22 and a second chamber 25 connected to the second outlet 23. The first chamber 24 is formed in the space inside the hollow column-structured separating wall 71, and the second chamber 25 is formed in an outer space around the first chamber 24. The first chamber 24 is in fluid communication with the second chamber 25 via the filter pores on the filter gauze 712.

[0021] When the washing machine 100 ends a washing process and needs to drain the washing water, the washing machine 100 controls the circulation drive motor 5 to operate and the drain drive motor 6 not to operate. The washing water at the bottom of the outer barrel 111 of the washing machine enters the first chamber 24 via the water flow inlet 21 of the filter chamber and the water inlet 72 of the filter, then passes through the column-structured separating wall 71, and enters the second chamber 25. At this time, foreign substances in the washing water are filtered out by the filter gauze 712 on the separating wall 71 and are attached to the separating wall 71 or retained in the first chamber 24. After that, the washing water again enters the circulation pump chamber 3 via the second outlet 23 of the filter chamber. Under drive of the circulation drive motor 5, the washing water is again sucked back to the inner barrel 112 via the water outlet 31 to participate in the washing process. Since the washing water is filtered by the separating wall 71 of the filter in the circulating process, foreign substances, such as flocks, in the washing water are filtered out in the repeated process of circulating water, and the foreign substances do not again enter the washing inner barrel 112 to be attached to the washed clothes. In this way, the washed and cleaned clothes are not attached with foreign substances such as flocks and appear to be cleaner.

[0022] When the washing machine 100 ends a washing process and needs to drain the washing water, the washing machine 100 controls the drain drive motor 6 to operate and the circulation drive motor 5 not to operate. The washing water at the bottom of the outer barrel 111 of the washing machine enters the first chamber 24 via the water flow inlet 21 of the filter chamber and the water inlet 72 of the filter and then enters the drain pump chamber 4 via the water outlet 73 of the filter and the first outlet 22 of the filter chamber, and under drive of the drain drive motor 6, the washing water are discharged from the washing machine to the outside via the drain outlet 41. In the process of draining water, the foreign substances such as flocks that are originally attached to the separating wall 71 of the filter or retained in the first chamber 24 may be washed by the washing water to leave together with the washing water, so as to be discharged from the washing machine to the outside, thereby implementing cleaning of the filter 7 by the machine. To better clean the foreign substances on the separating wall 71 of the filter or in the first chamber 24, in the process in which the washing machine controls water draining, a rotation rate of the drain drive motor 6 may be increased to accelerate a flow rate of the water stream, to make a washing force applied on the separating wall 71 of the filter or the first chamber 24 by the washing water become greater, thereby cleaning and discharging more foreign substances. In this way, a user does not need to additionally disassemble the filter 7 for removing foreign substances, thereby avoiding many troubles. Meanwhile, the user also does not need to worry about forgetting to clean the foreign substances on the filter 7 regularly which influences performance of the circulating drainage apparatus 101.

[0023] The series of detailed descriptions listed in the preceding text are only specific descriptions of feasible implementation manners of the present invention, and are not intent to limit the scope of protection of the present invention. For example, in another implementation manner, the separating wall 71 does not present a column structure, but be constructed into a separator structure, and reinforcing ribs and a filter gauze are provided on the separator structure. The separator-structured separating wall, after being disposed in the filter chamber, separates the filter chamber into two parts, namely, the separator structure and a part of the wall of the filter chamber form the first chamber, and the separator structure and the other part of the wall of the filter chamber form the second chamber. In this case, the separator-structured separating wall does not need to be provided with a water inlet and a water outlet, the washing water flows in from the water flow inlet of the filter chamber enters the first chamber, and may directly flow into the drain pump chamber or enter the second chamber via the filter gauze on the separator structure. The drain pump chamber and the circulation pump chamber are also separated from each other by a separator-structured separating wall. In this way, the functions, of the circulating drainage apparatus, of circulating water, draining water, and cleaning by itself in the preceding implementation manner also can be implemented. Therefore, any equivalent implementation manners or alterations made within the spirit of the technology of the present invention shall fall within the scope of protection of the present invention.

Claims

1. A circulating drainage apparatus comprising a shell (1), the shell (1) being provided with a filter chamber (2), a circulation pump chamber (3), and a drain pump chamber (4), and the filter chamber (2) being provided with a water flow inlet (21), a first outlet (22), and a second outlet (23), wherein the first outlet (22) is in communication with the drain pump chamber (4), and the second outlet (23) is in communica-

tion with the circulation pump chamber (3);
a circulation drive motor (5), connected to the circulation pump chamber (3);
a drain drive motor (6), connected to the drain pump chamber (4); and
characterized in that, the filter chamber (2) is provided with a separating wall (71), to separate a space in the filter chamber (2) into a first chamber (24) that connects the water flow inlet (21) and the first outlet (22) and a second chamber (25) connected to the second outlet (23), the separating wall (71) is provided with filter pores, and the first chamber (24) is in fluid communication with the second chamber (25) via the filter pores.

2. The circulating drainage apparatus according to claim 1, **characterized in that**, the filter pores of the separating wall (71) are configured to filter out foreign substances from a water stream that flows into the second chamber (25) from the first chamber (24).

3. The circulating drainage apparatus according to claim 1 or 2, **characterized in that**, the separating wall (71) winds to form a hollow column structure in the filter chamber (2), wherein the first chamber (24) is formed in the column structure; and the column structure is provided with a water inlet (72) in communication with the water flow inlet (21) of the filter chamber and a water outlet (73) in communication with the first outlet (22) of the filter chamber.

4. The circulating drainage apparatus according to claim 3, **characterized in that**, the water inlet (72) is provided on a side wall of the column structure and the water outlet (73) is provided on the column structure at an end close to the drain pump chamber (4).

5. The circulating drainage apparatus according to claim 1, **characterized in that**, the separating wall (71) is a separator structure, and the first chamber (24) and the second chamber (25) are formed by the separator structure and a wall of the filter chamber (2), separately.

6. The circulating drainage apparatus according to claim 5, **characterized in that**, the separator structure is configured to separate the circulation pump chamber (3) from the drain pump chamber (4).

7. The circulating drainage apparatus according to claim 1, **characterized in that**, a filter (7) having the separating wall (71) is detachably disposed in the filter chamber (2) of the shell (1).

8. A household appliance that drives water to move, comprising the circulating drainage apparatus (101) according to anyone of the preceding claims.

9. The household appliance that drives water to move according to claim 8, **characterized in that**, the household appliance is a dish-washing machine or a washing machine.

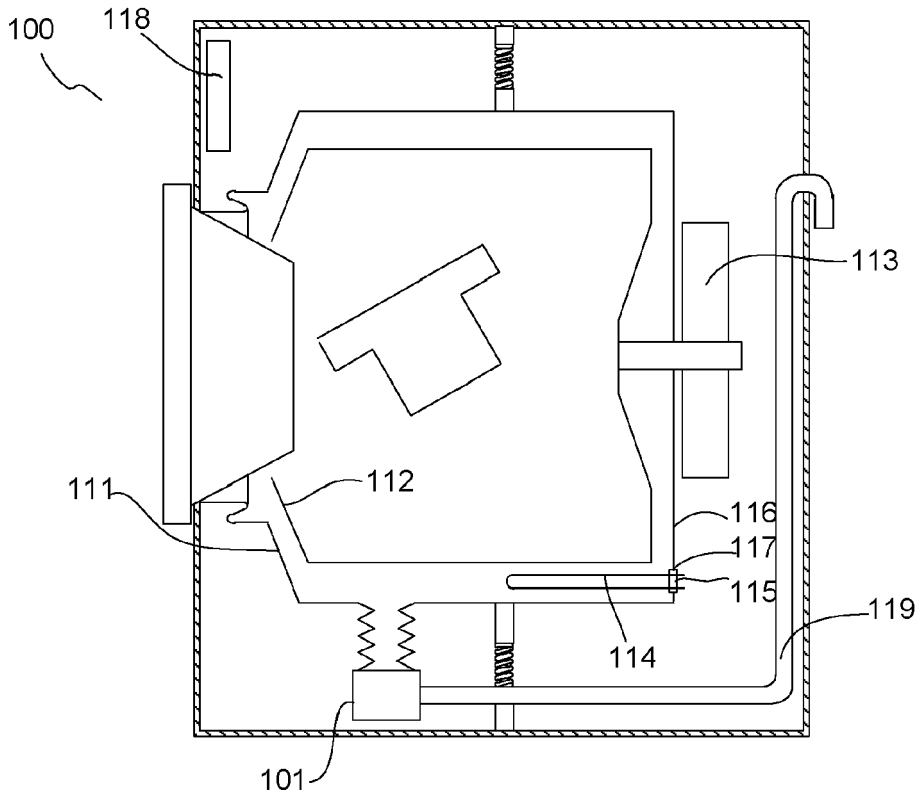

FIG. 1

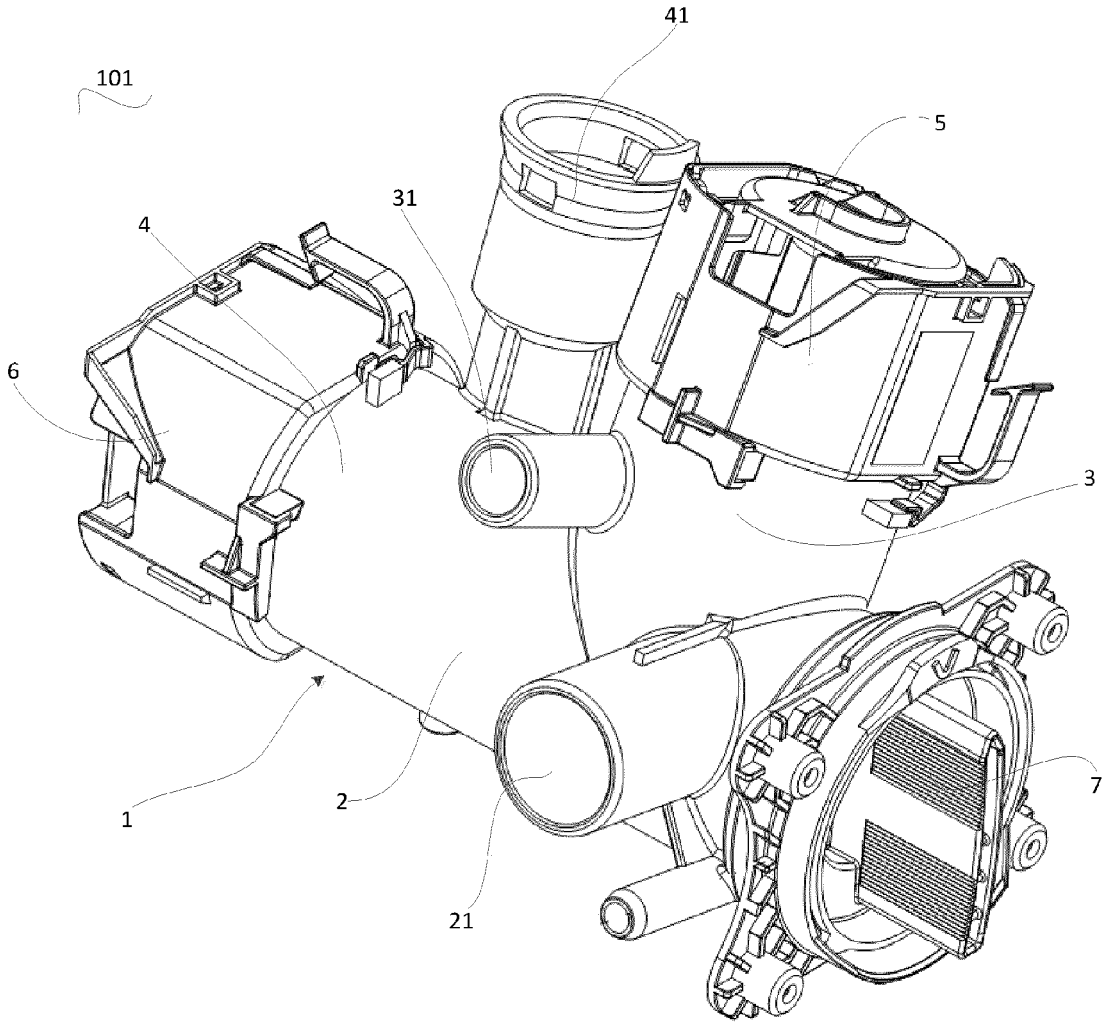

FIG. 2

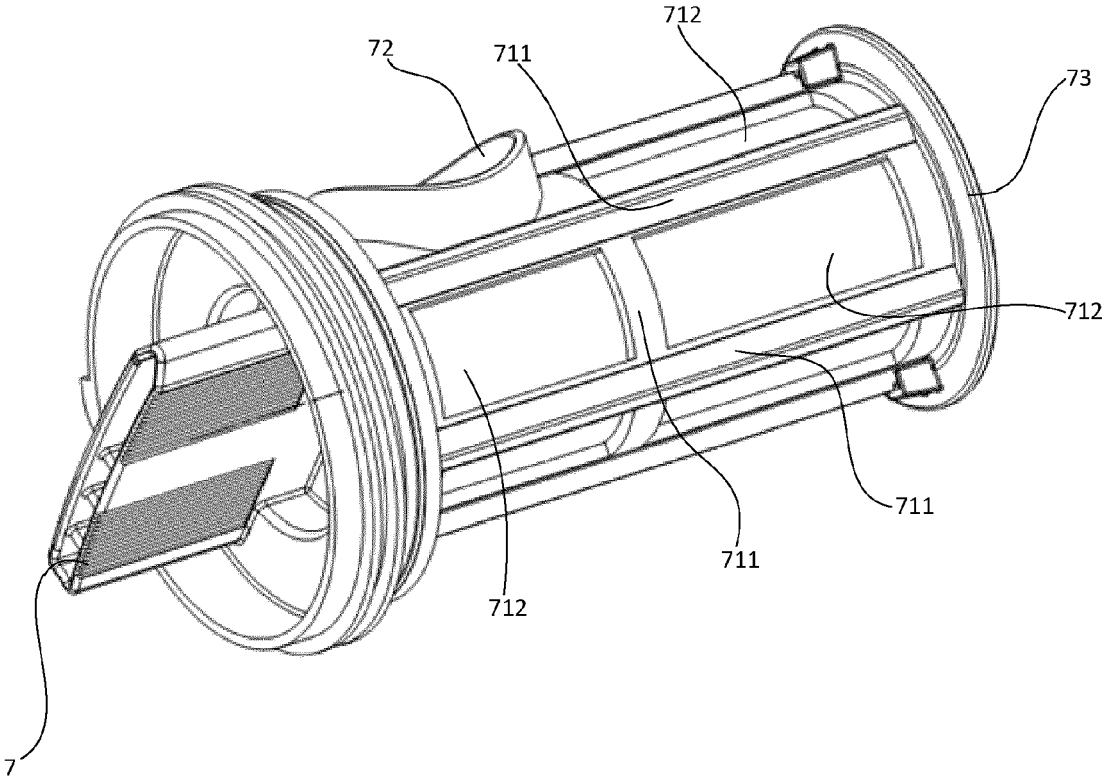

FIG. 3

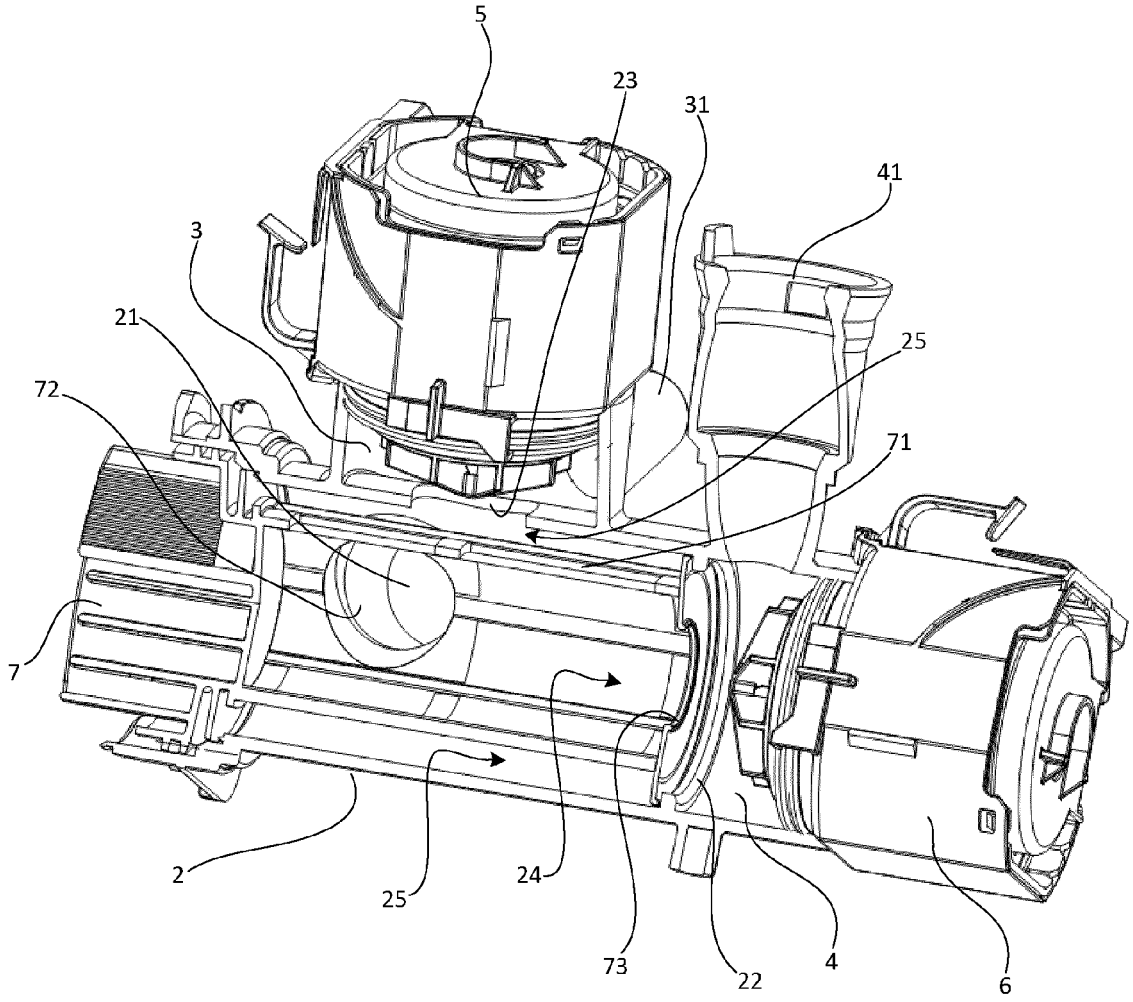

FIG. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 19 6023

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	US 2014/014595 A1 (KOO RAJAN [AU] ET AL) 16 January 2014 (2014-01-16) * paragraphs [0077] - [0094], [0124] - [0126], [0141]; figures 1-7, 13-15, 17, 19 & 20 *	1-9	INV. D06F39/08 D06F39/10
X	WO 2014/089651 A1 (ELECTROLUX DO BRASIL SA [BR]) 19 June 2014 (2014-06-19) * abstract * * page 9, line 24 - page 13, line 12; figures 4-6b *	1-9	
A	US 3 727 435 A (MENK M) 17 April 1973 (1973-04-17) * the whole document *	1-9	
A	DE 11 91 781 B (SIEMENS ELEKTROGERAETE GMBH) 29 April 1965 (1965-04-29) * the whole document *	1-9	
A	DE 100 46 349 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 28 March 2002 (2002-03-28) * the whole document *	1-9	TECHNICAL FIELDS SEARCHED (IPC) D06F
A	US 2012/186306 A1 (KIM JIN DOO [KR] ET AL) 26 July 2012 (2012-07-26) * the whole document *	1-9	
A	KR 2008 0093493 A (SAMSUNG ELECTRONICS CO LTD [KR]) 22 October 2008 (2008-10-22) * the whole document *	1-9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 March 2016	Prosig, Christina

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 15 19 6023

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.

22-03-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014014595 A1	16-01-2014	CN 103228836 A	31-07-2013
		EP 2638201 A1	18-09-2013
		RU 2013126606 A	20-12-2014
		US 2014014595 A1	16-01-2014
		WO 2012061880 A1	18-05-2012
WO 2014089651 A1	19-06-2014	BR 102012031706 A2	02-09-2014
		WO 2014089651 A1	19-06-2014
US 3727435 A	17-04-1973	NONE	
DE 1191781 B	29-04-1965	NONE	
DE 10046349 A1	28-03-2002	NONE	
US 2012186306 A1	26-07-2012	CN 202559120 U	28-11-2012
		EP 2479336 A1	25-07-2012
		EP 2792783 A2	22-10-2014
		KR 20120084899 A	31-07-2012
		US 2012186306 A1	26-07-2012
KR 20080093493 A	22-10-2008	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 202559120 U **[0002]**