(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 January 2014 (30.01.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/016158 A1

(51) International Patent Classification:
A47L 15/48 (2006.01) *D06F 25/00* (2006.01)
D06F 58/24 (2006.01)

(21) International Application Number:
PCT/EP2013/064921

(22) International Filing Date:
15 July 2013 (15.07.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201210271503.3 27 July 2012 (27.07.2012) CN

(71) Applicant: **BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH** [DE/DE]; Carl-Wery-Str. 34, 81739 München (DE).

(72) Inventors: **CHEN, Yanhong**; 18-1-602,e mei ling,Gulou district, Nanjing, China Nanjing, Jiangsu 210000 (CN). **LI, Maoyin**; No.40, Li ying, Li Yao Chun, Xiongzhou town, Liuhe district, Nanjing city, Jiangsu provinces, Nanjing, Jiangsu 211500 (CN). **ZHU, Yanglei**; 8-107.Yueyuan er cun, Xuanwu district, Nanjing, China Nanjing, Jiangsu 210000 (CN). **ZIEGLER, Jörg**; Marienburger Str. 6, 10405 Berlin (DE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: HOUSEHOLD APPLIANCE HAVING A WATER SUPPLY ASSEMBLY

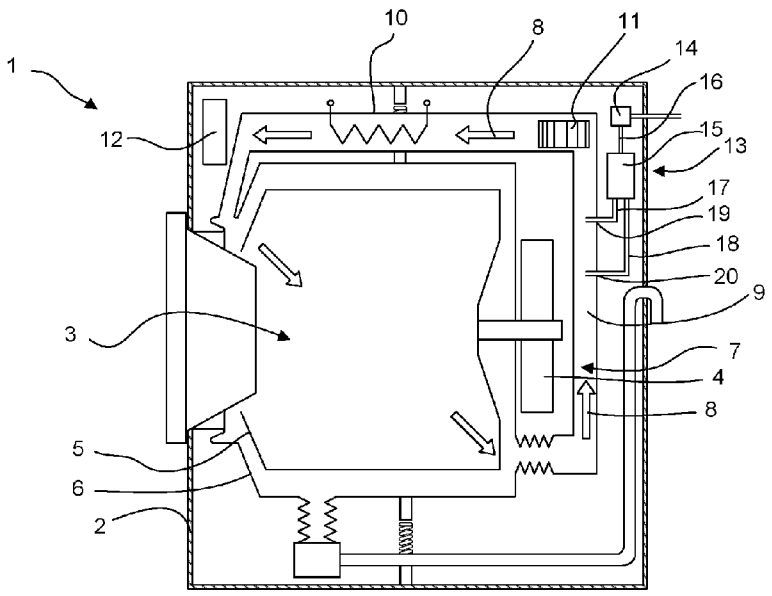


FIG. 1

(57) Abstract: Disclosed is a household appliance 1 having a water supply assembly 13, comprising a water cavity 9, wherein the water cavity 9 has a first water injection nozzle 19 and a second water injection nozzle 20, and the water supply assembly 13 is connected to the first water injection nozzle 19 and the second water injection nozzle 20 of the water cavity 9 to supply water into the water cavity 9. The water supply assembly 13 comprises: a water inlet pipe 16 capable of bringing in water of different flow rates, a first water outlet pipe 17 and a second water outlet pipe 18 respectively connected to the first water injection nozzle 19 and the second water injection nozzle 20, and a water flow allocation device 15 connected among the water inlet pipe 16, the first water outlet pipe 17, and the second water outlet pipe 18 to bring the water from the water inlet pipe 16 into the first water outlet pipe 17 or the second water outlet pipe 18 according to the different flow rates of the water.

WO 2014/016158 A1

HOUSEHOLD APPLIANCE HAVING A WATER SUPPLY ASSEMBLY

The present invention relates to a household appliance, and in particular, to a household appliance having a water cavity, which includes a water supply assembly that supplies water to the water cavity.

Household appliances, especially those using water, usually have a water cavity and a water supply assembly injecting water to the water cavity. Water supply assemblies of some household appliances have two or more water supply pipes, so as to supply water for different purposes. Further, such assembly has a facility to add washing agents like detergents and softeners to the water in the water cavity.

Taking a drying machine of the condensing type or washing and drying machine as examples, a laundry processing drum is usually disposed in the housing thereof; a condensation channel is connected to the clothes processing drum, so as to condense moisture taken from the clothes in the clothes processing drum by circulating drying air. A first water inlet pipe and a second water inlet pipe may be connected to the condensation channel, so as to supply the condensation channel with cooling water for cooling the drying air and cleaning water for washing away flock attached on an inner wall of the condensation channel. In the conventional solution, the first water inlet pipe and the second water inlet pipe are connected to respective water inlet valves. Meanwhile, to prevent water in the drying machine or washing and drying machine from being sucked back into a common water supply system and polluting the water supply system due to an unexpected negative pressure generated in the water supply system when the water level in the clothes processing drum exceeds the first water inlet pipe and/or the second water inlet pipe, an adapting device in communication with the ambient atmosphere is usually disposed on each of the first water inlet pipe and the second water inlet pipe. The water inlet pipe and the adapting device thereof in such design are relatively complex, and occupy much mounting space in the machine.

An objective of the present invention is to simplify a water supply assembly of a household appliance.

To meet this and other objectives the invention provides a solution as defined in the attached independent claim. Preferred embodiments of the invention are defined in dependent claims, where embodiments defined in different claims may be combined with each other absent any technical reason against such combination. Preferred embodiments are also defined in the subsequent description and the attached drawing.

Accordingly, the present invention employs the following technical solution: A household appliance includes a water cavity; the water cavity has a first water injection nozzle and a second water injection nozzle, and a water supply assembly is connected to the first water injection nozzle and the second water injection nozzle of the water cavity to supply water into the water cavity. The water supply assembly includes a water inlet pipe capable of bringing in water of different flow rates, a first water outlet pipe and a second water outlet pipe respectively connected to the first water injection nozzle and the second water injection nozzle, and a water flow allocation device connected among the water inlet pipe, the first water outlet pipe, and the second water outlet pipe to bring the water from the water inlet pipe into the first water outlet pipe or the second water outlet pipe according to the different flow rates of the water.

Further, a water valve device is disposed on the water inlet pipe so as to bring water of a first flow rate or second flow rate into the water inlet pipe. The first flow rate is greater than the second flow rate. Guided by the water flow allocation device, water of the first flow rate flows out from the first water outlet pipe, and water of the second flow rate flows out from the second water outlet pipe.

Preferably, the water flow allocation device includes a first water flow channel in communication with the first water outlet pipe and a second water flow channel in communication with the second water outlet pipe, where a water inlet end of the second water flow channel is directly connected to a water inlet pipe terminal, and a gap exists between projections of a water inlet end of the first water flow channel and the water inlet pipe terminal on a horizontal plane.

Preferably, a central axis of the water inlet pipe terminal approximately coincides with a central axis of the water inlet end of the first water flow channel.

Preferably, an air pipe in communication with atmosphere is disposed on the water flow allocation device, and the air pipe is in communication with the first water flow channel and the second water flow channel respectively.

Preferably, the first water flow channel is partitioned by an air gap into an upper portion and a lower portion opposite each other in a vertical direction.

Preferably, an inner pipe diameter of the upper portion is less than an inner pipe diameter of the lower portion.

Preferably, a block sheet for preventing a water flow from entering the air gap and for leading the water flow into the second water flow channel is disposed in a direction of the vertical air gap facing the water inlet pipe.

Preferably, the household appliance includes a clothes drying drum, where the water cavity is a condensation channel connected to the clothes drying drum, the first water injection nozzle supplies clean water to the condensation channel, and the second water injection nozzle supplies cooling water to the condensation channel.

Compared with the prior art, the household appliance employs a water flow allocation device to allocate water from the water inlet pipe to two water outlet pipes, so that only one water inlet pipe is used, and meanwhile, it is unnecessary to set a water flow adapting device on each water pipe as in the prior art. The water flow allocation device can provide a channel in communication with atmosphere to the first water outlet pipe and the second water outlet pipe at the same time. Hence, the present invention is simpler and more compact in structure, occupies less space, is easy to mount, and meanwhile saves cost.

The present invention is applicable to various household appliances, and is particularly applicable to a drying machine or a washing and drying machine. The application in the washing and drying machine is taken as a preferred embodiment, and as an example in the following to describe the specific implementation manner of the present invention in detail with reference to the accompanying drawing.

FIG. 1 is a schematic view of a washing and drying machine;

FIG. 2 is a schematic view of a first water outlet pipe and a second water outlet pipe of a water flow allocation device;

FIG. 3A is a cross sectional view of the first water outlet pipe and the second water outlet pipe of the water flow allocation device in FIG. 2, where a dashed line with an arrow in FIG. 3A is a path along which the water flow passes through the first water flow channel; and

FIG. 3B is a cross sectional view of the first water outlet pipe and the second water outlet pipe of the water flow allocation device in FIG. 2, where a dashed line with an arrow in FIG. 3B is a path along which the water flow passes through the second water flow channel.

As shown in FIG. 1, a washing and drying machine 1 has a clothes processing drum assembly 3 in a box 2, and includes an inner drum 5 capable of rotating when driven by a motor 4, and a water storage tub 6 sleeved outside the inner drum 5. The water storage tub 6 is connected to two ends of a drying air channel 7, so that drying air 8 can circulate in the clothes processing drum assembly 3 and the drying air channel 7. The drying air channel 7 includes a condensation channel 9 and a heating channel 10; meanwhile, a blower 11 is disposed in the drying air channel 7 so as to propel the drying air 8 circulating in the clothes processing drum assembly 3 and the drying air channel 7. In this embodiment the condensation channel 9 defines a water cavity 9 due to the fact that water may be brought into it as detailed below.

The washing and drying machine 1 further has a control device 12, which controls different equipment in the machine to run according to program settings. Under the control of the control device 12, in a drying program, the heating channel 10 heats the drying air 8 flowing therein; after being heated, the high-temperature drying air 8 enters the clothes processing drum assembly 3 under the effect of the blower 11 and heats wet clothes in the inner drum 5, so that moisture in the clothes is evaporated; carrying the evaporated moisture, the drying air 8 enters the condensation channel 9. In the condensation channel 9, moisture in the drying air 8 is condensed into liquid again, so as to be

separated from the drying air 8; hence, the drying air 8 returns to a low temperature and becomes dry again, and driven by the blower 11, enters the heating channel 10 again to start a new circulation. Such circulation is repeated until the clothes in the inner drum are finally dried.

In order to condense the drying air 8 in the water cavity 9 or condensation channel 9 and meanwhile to wash away flock or lint attached on an inner wall of the condensation channel 9, the condensation channel 9 is connected with the water supply assembly 13 that supplies water thereto. The water supply assembly 13 includes a water valve device 14 connected to a water source and a water flow allocation device 15 downstream of the water valve device 14; the water valve device 14 and the water flow allocation device 15 are connected by a water inlet pipe 16. The water flow allocation device 15 is connected with the first water outlet pipe 17 and the second water outlet pipe 18 downstream, where the first water outlet pipe 17 is connected to a first water injection nozzle 19 on the condensation channel 9, so as to supply cleaning water to the condensation channel 9, and the second water outlet pipe 18 is connected to a second water injection nozzle 20 on the condensation channel 9, so as to supply cooling water to the condensation channel 9. In a vertical direction, the position of the first water injection nozzle 19 is higher than that of the second water injection nozzle 20. Preferably, the first water injection nozzle 19 is close to a top portion of the condensation channel 9, so that the cleaning water washes the entire condensation channel 9 from top down. The second water injection nozzle 20 is close to a middle and lower portions of the condensation channel 9 and close to an air inlet end of the drying air 8, so that the cooling water fully cools the drying air 8.

Generally, cooling water needs to be supplied during most time of the drying program. To save water, the flow rate of the cooling water should be as small as possible under the premise of satisfying the drying requirement. However, in order to completely wash away flock attached on the inner wall of the condensation channel 9, water of a great flow rate is required, so as to achieve a desirable washing effect. Cleaning water is usually supplied at the end of the drying program, and lasts a short period of time. According to such a principle, the control device 12 controls the water valve device 14 to supply cleaning water of a first flow rate V1 to the water inlet pipe 16 at the end of the drying stage, and to supply cooling water of a second flow rate V2 to the water inlet pipe 16 during the drying stage. Definitely, the water valve device 14 may also supply cleaning water of the first

flow rate V1 to the water inlet pipe 16 during other time segments of the drying program or even during a washing program, so as to wash the condensation channel 9. The first flow rate V1 is greater than the second flow rate V2.

As shown in FIG. 2 to FIG. 3B, a first water flow channel 21 in communication with the first water outlet pipe 17 and a second water flow channel 22 in communication with the second water outlet pipe 18 are formed in the water flow allocation device 15. A water inlet end 23 of the second water flow channel 22 is directly connected to a terminal 24 of the water inlet pipe 16; a gap 26 exists between projections of the water inlet end 25 of the first water flow channel 21 and the water inlet pipe terminal 24 on a horizontal plane. The gap 26 is designed as follows: whether or not a certain height difference exists between the water inlet end 25 of the first water flow channel 21 and the water inlet pipe terminal 24, the gap 26 exists between the projections thereof on the horizontal plane, and the cleaning water of the first flow rate V1 flowing out from the water inlet pipe 16 can flow across the gap 26 and enter the first water flow channel 21; the cooling water of the second flow rate V2 flowing out from the water inlet pipe 16 cannot flow across the gap 26 and thus cannot enter the first water flow channel 21 due to the low flow rate thereof, but can only fall into the second water flow channel 22 with an opening under the gap 26. The cleaning water of the greater first flow rate V1 enters the first water flow channel 21 via the water inlet pipe 16, and further enters the condensation channel 9 via the first water injection nozzle 19 to wash away flock attached in the condensation channel 9. The cooling water of the smaller second flow rate V2 enters the second water flow channel 22 via the water inlet pipe 16 during the drying process, and further enters the condensation channel 9 via the second water injection nozzle 20 to condense moisture carried in the drying air 8. Preferably, a central axis 24a of the water inlet pipe terminal 24 approximately coincides with a central axis 25a of the water inlet end 25 of the first water flow channel 21. In other implementation manners, the central axis 24a of the water inlet pipe terminal 24 may be slightly higher than the central axis 25a of the water inlet end 25 of the first water flow channel 21, so as to ensure that water of the first flow rate V1 can still fall into the water inlet end 25 of the first water flow channel 21 after flowing across the gap 26 under the effect of the gravity.

To prevent water in the washing and drying machine 1 from being sucked back into a common water supply system and polluting the water supply system due to an unexpected negative pressure generated in the water supply system when the water level in the water storage tub 6 exceeds the first water flow channel 21 and/or second water flow channel 22, an air pipe 27 in communication with atmosphere is disposed on the water flow allocation device 15, and the air pipe 27 is in communication with the first water flow channel 21 and the second water flow channel 22 respectively, so as to balance the pressure and prevent back suction

As a preferred solution, the first water flow channel 21 is partitioned by an air gap 28 into an upper portion 21a and a lower portion 21b opposite each other in a vertical direction. An inner pipe diameter of the upper portion 21a is less than an inner pipe diameter of the lower portion 21b, so that water flowing out from the upper portion 21a can completely fall into the lower portion 21b. Meanwhile, to fully utilize the cooling water and prevent the cooling water from entering the air gap 28 of the first water flow channel 21, a block sheet 29 for preventing a water flow from entering the air gap 28 and for leading the water flow into the second water flow channel 22 is disposed in a direction of the air gap 28 facing the water inlet pipe 16.

The above embodiments are merely preferred embodiments of the present invention. The present invention may have many other embodiments. Any equivalent replacement made by persons of ordinary skill in the art under the teaching of the present invention shall fall within the scope of the claims of the present invention.

CLAIMS

1. A household appliance (1) having a water supply assembly (13), comprising a water cavity (9), wherein the water cavity (9) has a first water injection nozzle (19) and a second water injection nozzle (20), and the water supply assembly (13) is connected to the first water injection nozzle (19) and the second water injection nozzle (20) of the water cavity (9) to supply water into the water cavity (9), **characterized in that**: the water supply assembly (13) comprises: a water inlet pipe (16) capable of bringing in water of different flow rates, a first water outlet pipe (17) and a second water outlet pipe (18) respectively connected to the first water injection nozzle (19) and the second water injection nozzle (20), and a water flow allocation device (15) connected among the water inlet pipe (16), the first water outlet pipe (17), and the second water outlet pipe (18) to bring the water from the water inlet pipe (16) into the first water outlet pipe (17) or the second water outlet pipe (18) according to the different flow rates of the water.

2. The household appliance (1) according to claim 1, characterized in that: the water flow allocation device (15) comprises a first water flow channel (21) in communication with the first water outlet pipe (17) and a second water flow channel (22) in communication with the second water outlet pipe (18), wherein a water inlet end (23) of the second water flow channel (22) is directly connected to a water inlet pipe terminal (24), and a gap (26) exists between projections of a water inlet end (25) of the first water flow channel (21) and the water inlet pipe terminal (24) on a horizontal plane.

3. The household appliance (1) according to claim 2, characterized in that: a central axis (24a) of the water inlet pipe terminal (24) approximately coincides with a central axis (25a) of the water inlet end (25) of the first water flow channel (21).

4. The household appliance (1) according to claim 2, characterized in that: an air pipe (27) in communication with atmosphere is disposed on the water flow allocation device (15), and the air pipe (27) is in communication with the first water flow channel (21) and the second water flow channel (22), respectively.

5. The household appliance (1) according to claim 4, characterized in that: the first water flow channel (21) is partitioned by an air gap (28) into an upper portion (21a) and a lower portion (21b) opposite each other in a vertical direction.

6. The household appliance (1) according to claim 5, characterized in that: an inner pipe diameter of the upper portion (21a) is less than an inner pipe diameter of the lower portion (21b).

7. The household appliance (1) according to claim 5, characterized in that: a block sheet (29) for preventing a water flow from entering the air gap (28) and for leading the water flow into the second water flow channel (22) is disposed in a direction of the air gap (28) facing the water inlet pipe (16).

8. The household appliance (1) according to any one of claims 1 to 7, characterized by further comprising: a clothes drying drum (3, 5, 6), wherein the water cavity (9) is a condensation channel (9) connected to the clothes drying drum (3, 5, 6), the first water injection nozzle (19) supplies clean water to the condensation channel (9), and the second water injection nozzle (20) supplies cooling water to the condensation channel (9).

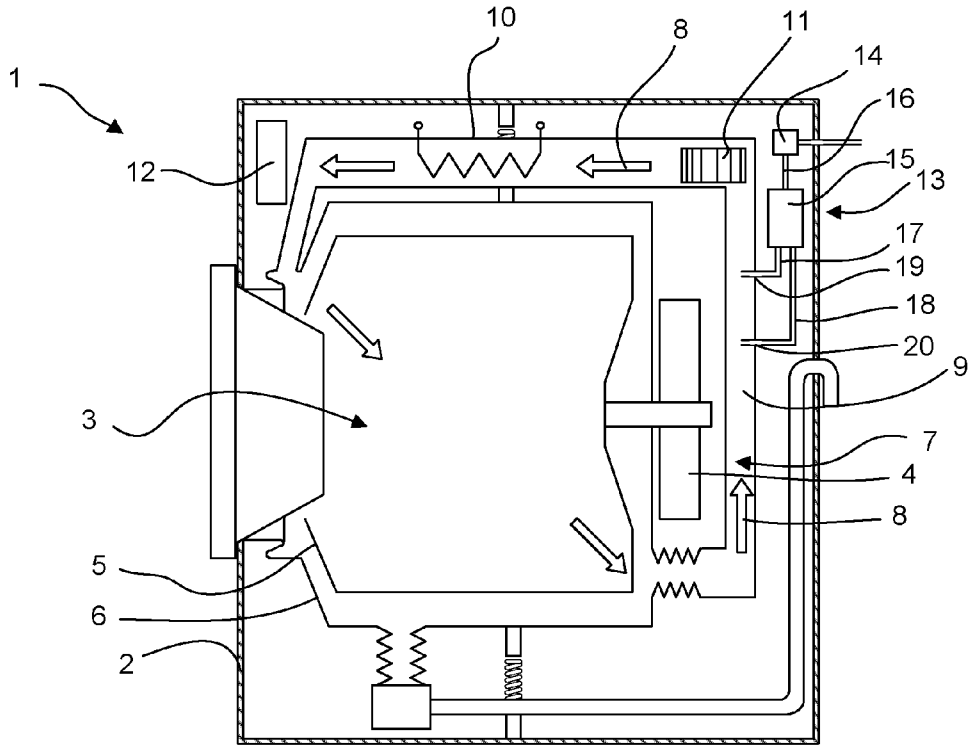


FIG. 1

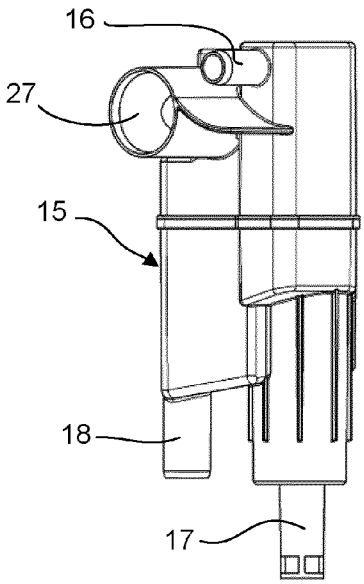


FIG. 2

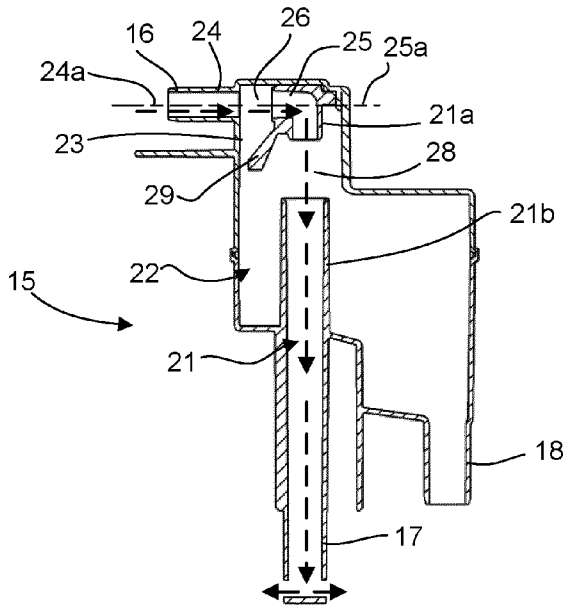

16
24
26
25
25a
24a
21a
23
28
29
21b
22
15
21
18
17

FIG. 3A

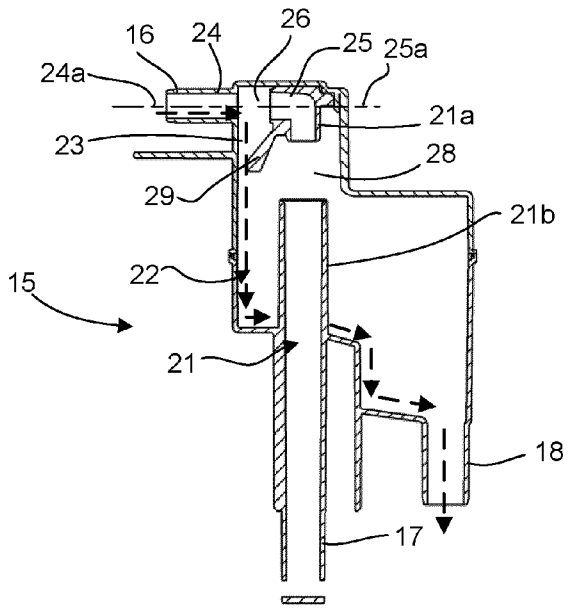

16
24
26
25
25a
24a
21a
23
28
29
21b
22
15
21
18
17

FIG. 3B

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/064921

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L15/48 D06F58/24 D06F25/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47L D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005/090670 A2 (ARCELIK AS [TR]; DIKMENLI SERAP [TR]; TUNCEL TUNC [TR]) 29 September 2005 (2005-09-29) the whole document -----	1-8
A	GB 2 228 308 A (SERVIS GROUP LIMITED [GB]) 22 August 1990 (1990-08-22) the whole document -----	1-8
A	EP 0 340 403 A2 (MERLONI A SPA [IT]) 8 November 1989 (1989-11-08) the whole document -----	1-8
A	GB 2 172 977 A (HOTPOINT LTD) 1 October 1986 (1986-10-01) column 2, line 126 - column 3, line 113 ----- -/--	1-8

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 September 2013	24/09/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Jezierski, Krzysztof

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/064921

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2 078 779 A1 (ELECTROLUX HOME PROD CORP [BE]) 15 July 2009 (2009-07-15) paragraph [0012] - paragraph [0033]	1-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2013/064921

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005090670 A2	29-09-2005	TR 200604992 T1	22-01-2007
		WO 2005090670 A2	29-09-2005
GB 2228308 A	22-08-1990	NONE	
EP 0340403 A2	08-11-1989	EP 0340403 A2	08-11-1989
		IT 1217490 B	22-03-1990
GB 2172977 A	01-10-1986	GB 2172977 A	01-10-1986
		NZ 215572 A	29-04-1988
EP 2078779 A1	15-07-2009	AT 516399 T	15-07-2011
		EP 2078779 A1	15-07-2009
		EP 2345758 A1	20-07-2011
		EP 2345759 A1	20-07-2011
		ES 2369801 T3	07-12-2011
		PL 2078779 T3	29-02-2012