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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
07 February 2019 (07.02.2019)

WIPO | PCT

(10) International Publication Number
WO 2019/025849 A1

(51) International Patent Classification:
A47L 15/42 (2006.01) *D06F 39/08* (2006.01)

(21) International Application Number:
PCT/IB2018/000763

(22) International Filing Date:
20 July 2018 (20.07.2018)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:
102017000089318 03 August 2017 (03.08.2017) IT

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(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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, 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, SA, 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, ST, 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))*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) Title: PRIMING OR SUCTION TANK FOR WASHING MACHINES

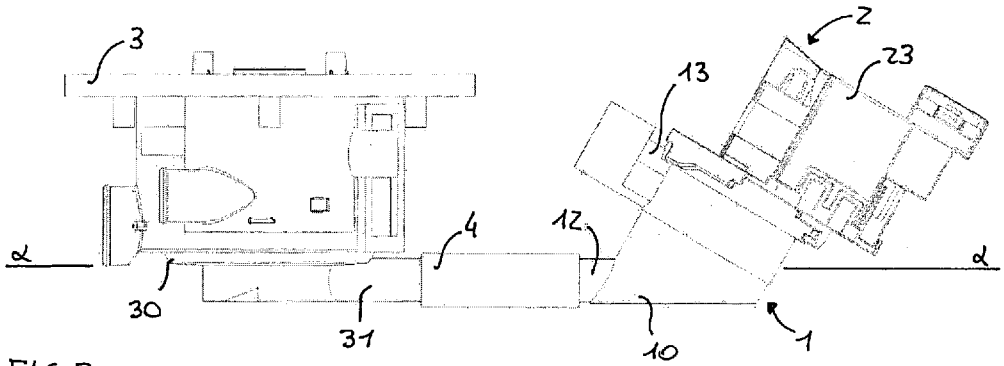


FIG. 2

(57) Abstract: Priming or suction tank (1) for washing machines, where said tank (1) comprises a container body (10) adapted to define a cavity where at least an impeller (20) of a circulation pump (2), suitably connected to a collection sump (3) of the washing water is housed, said container body (10) being provided with at least one coupling sleeve (12), suitably connected to said collection sump (3) by suitable union means (4), and at least one outlet sleeve (13), suitably connected with the washing water circulation system or the discharge system or the like, characterised in that - said tank (1) is shaped in such a way to offer said impeller (20) a level of water sufficient to guarantee the operation thereof; - said cavity is in such position to be flooded with the washing water coming from the sump (3), so as to guarantee the optimal suction to said impeller (20); - at least the pump body (23) of said circulation pump (2) is positioned above the laying plane (α-α) of the bottom (30) of the said collection sump (3).

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PRIMING OR SUCTION TANK FOR WASHING MACHINES

DESCRIPTION

The object of the present invention is a priming or suction tank for washing machines, in particular for dishwasher machines.

The invention therefore falls within the field of dishwashers, particularly in the household sector or the like.

Obviously, nothing prevents the application of the invention to be extended also to fields other than the household one, such as for example industrial, catering or in general for all those fields or applications requiring the washing of dishes, pots, kitchen utensils or the like.

The current dishwashers are equipped with a washing water collection sump, suitably connected to a circulation pump so that said water can flow towards the inlet (or suction) section of said pump and be expelled outside the machine or, depending on the construction variants, recirculated to implement one or more washing steps.

In general, the collection sump is positioned in the proximity of the lower zone of the washing tank, so that the washing water can flow and collect therein, by gravity or fall.

In the proximity of the bottom of the collection sump there is provided an opening which puts the inside of said sump in communication with a sleeve, said sleeve being connected to the pump inlet.

In particular, the bottom of the sump must be at a height coinciding with the height of the suction of the pump so as to ensure correct priming to the same pump, i.e. it must be ensured that the inlet section of the pump sucks only water avoiding the presence of air.

This condition is guaranteed with differences in hight between the sump and the pump, increasing the vertical overall dimensions of said components.

To satisfy said condition, the prior art envisages installing the circulation pump below the bottom of the sump, increasing the overall dimensions in the lower part of the dishwasher.

Said installation configuration is schematically illustrated in Fig. 1, which shows a simplified view of a collection sump 3 and of a circulation pump 2 connected to each other by a sleeve 300.

By observing Fig. 1 it can be deduced that the bottom 30 of the sump 3 is located above the circulation pump 2, with the discharge at the suction of the pump 2 so as to be able to feed the inlet section of said pump 2.

H indicates the difference in height between the bottom 30 of the sump 3 and the lying plane of the pump; h therefore represents the contribution to the increase in the vertical overall dimensions generated by the pump-sump coupling provided by the prior art.

For practical, noise, vibration or installation reasons, the bottom 30 of the sump 3, the sleeve 300 and the pump 2 are never in contact with the bottom of the dishwashing machine, i.e. said elements generally do not rest directly on said bottom, but are raised relative to it.

Said modus operandi, together with the mutual heights of the components adapted to ensure correct operation (difference in height h in Fig. 1), leads to an increase in the overall dimensions in the assembly of the dishwasher components.

Such increase, with particular reference to the overall dimensions, affects and reduces the space available in the tank for the components intended for the washing operation.

The problem that is intended to be resolved concerns such arrangement of the components and the loss of space it involves.

Said loss of space affects the entire structure of the dishwashing machine, limiting the spaces thereof that can be used and employed for housing the dishes.

It should be considered, for example, that in some dishwashers the arrangement or the vertical height of the various components is such as not to allow the installation of a third auxiliary rack.

This is in contrast with the current market requirements, which require machines with small overall dimensions and high loading capacities, i.e. higher load density is required with the machine overall dimensions being equal.

The main object of the present invention is to obviate the aforementioned drawbacks by providing a priming or suction tank for washing machines capable of reducing the vertical overall dimensions of the sump-pump assembly, ensuring optimum priming to said pump.

A further object of the present invention, at least for one or more executive variants, is to provide a priming or suction tank for washing machines capable of reducing the formation of bubbles in the proximity of the impeller.

A further object of the present invention, at least for one or more executive variants, is to provide a priming or suction tank for washing machines capable of imparting maximum freedom of installation of the pump.

This and other objects, which shall appear clear hereinafter, are achieved with a priming or suction tank for washing machines or the like, illustrated in the following description and in the annexed claims that constitute an integral part of the same description.

Further features of the present invention shall be better highlighted by the following description of a preferred embodiment, in accordance with the patent claims and illustrated, purely by way of a non-limiting example, in the annexed drawing tables, in which:

- Fig. 1 is a simplified view of a collection sump and of a circulation pump, connected by a sleeve, according to the prior art;

- Fig. 2 is a side view of the collection sump and of the circulation pump, connected by a sleeve and a possible embodiment variant of the priming tank according to the present invention;
- Fig. 3 is a section view of a portion of Fig. 2, in particular, it represents the section of the circulation pump and of the priming tank;
- Fig. 4 is a perspective view of Fig. 3;
- Fig. 5 is a bottom perspective view of Fig. 3;
- Fig. 6 is a detailed view of Fig. 5;
- Fig. 7 is a side view of the collection sump and of the circulation pump, connected by a sleeve and a second possible embodiment variant of the washing tank according to the present invention;
- Fig. 8 is a section view of Fig. 7, in particular, it represents the section of the circulation pump and of the priming tank;
- Fig. 9 is a perspective view of Fig. 8;
- Fig. 10 is a bottom perspective view of Fig. 8;
- Fig. 11 is a detailed view of Fig. 10.

The features of the invention are now described, using the references in the figure.

It is also noted that any dimensional and spatial term (such as "lower", "upper", "inner", "outer", "front", "rear", "vertical", "horizontal" and the like) refers to the position according to which substantially the elements are in operating conditions.

With the purpose of highlighting some features instead of others, not necessarily what described in the annexed drawings is to scale.

Reference numeral 1 indicates a possible embodiment variant of the priming tank according to the present invention.

Said priming tank 1, hereinafter, for convenience of description, just referred to as tray, comprises a container body 10 adapted to define a cavity where at least the impeller 20 of a circulation pump 2 is housed.

Said circulation pump 2 comprises a pump body 23 where the components of the

pump are housed, such as, for example, said impeller 20 and the relative actuating means (electric motors or the like), said pump body 23 being provided with an inlet section and an outlet section for water circulation.

Said priming tank 1 is characterised in that said cavity is divided into two spaces so as to define at least one pre-chamber and at least one priming tank.

According to a preferred variant, said tank 1 may comprise at least one divider element 11 appropriately arranged in said cavity.

Said divider element 11 may be made integrally with the container body 10, for example by moulding, or suitably inserted and fixed therein.

Said divider element 11 is provided with at least one opening 110 and divides said cavity into two spaces, so as to define at least one pre-chamber 100 and at least one priming chamber 101.

Said spaces are in fluid communication through said opening 110 and guarantee optimum operation to the impeller 20.

The pre-chamber 100, in fact, allows creating the reservoir that allows the impeller 20, even if mounted with vertical or oblique axis, to suck water through the divider element 11.

Moreover, said pre-chamber 100 serves as a dumper and equalizer of the water flow, avoiding, for example, that any jets of water may hit the impeller 20, while the priming chamber 101 houses the impeller 20 and is coupled with the inlet section 21 of said pump 2.

According to the variant shown in the accompanying figures, said two spaces are substantially overlapped; in particular the priming chamber 101 is defined and arranged above the pre-chamber 100.

Said container body 10 is further provided with at least one coupling sleeve 12, suitably connected to the discharge conduit 31 of the collecting sump 3 of the washing machine by suitable union means 4 (unions, hoses, joints, or the like), and at least one outlet sleeve 13, suitably connected to the washing water circulation system or the discharge system or the like.

As for the sump 3, it will not be further described or detailed, its structural and

functional features being substantially identical to those provided by the machines of the prior art.

In particular, according to a preferred variant, said coupling sleeve 12 is placed in the proximity of the base of the container body 10 and is in fluid communication with said pre-chamber 100, while said outlet sleeve 13 is placed in the proximity of the summit zone of said body 10 and is in fluid communication with said priming chamber 101.

The top of said container body 10 is open and couplable with the inlet section of the circulation pump 2, such that the impeller 20 is housed and operates in the priming chamber 101.

The pump body 23, therefore, serves as a closing element for the tank 1, avoiding that there may be water spills and leaks.

Such coupling may be carried out and achieved according to per se known techniques and means; for example, the dimensions of the opening of the tank 1 are such as to be able to releasably couple with the body or the inlet section of the pump 2.

The suction tank according to the present invention is characterised in that it allows installing the pump body 23 of the circulation pump 2, in particular the inlet section 21, above the lying plane α-α of the bottom 30 of the sump 3.

This allows solving the problems of the prior art, avoiding to provide differences in height between the sump and the pump so as to guarantee the correct priming to the impeller.

In particular, the tank 1 allows eliminating said differences in height, i.e. the height h of Fig. 1, greatly reducing the vertical overall dimensions of the sump-circulation pump assembly.

As previously described, in fact, the prior art envisages installing the circulation pump below the lying plane α-α of the bottom 30 of the sump 3, with the related problems of using the spaces.

According to the present invention, water, by the principle of communicating vessels, flows from the sump 3 and reaches the pre-chamber 100 through the

coupling sleeve 12, without the need for differences in height between the sump and the pump provided for in the prior art.

The water level in the pre-chamber 100 rises until filling it and through the opening 110 continues to fill also the priming chamber 101, so as to feed the impeller 20.

The function of the pre-chamber 100 is to receive and accommodate the washing water so as to guarantee an optimal and safe priming to the pump 2, i.e. to ensure the ideal suction to the impeller 20.

The impeller 20 sucks the water and sends it to the outlet sleeve 13.

With reference to the accompanying figures, given by way of a non-limiting example, it can be noted that the entire pump body 23, besides being arranged above the lying plane α-α of the bottom 30 of the sump 3, is substantially arranged next to said sump 3.

In particular, it can be observed that:

- in the variant of Figs. 1-5 the longitudinal axis of the circulation pump is inclined with respect to the lying plane α-α of the bottom 30 of the sump 3;
- in the variant of Figs. 6-10 the longitudinal axis of the circulation pump is substantially orthogonal with respect to the lying plane α-α of the bottom 30 of the sump 3.

Figs. 1-5 show a first possible embodiment variant of the tank 1, characterised in that the longitudinal axis of the pump 2 is inclined with respect to the lying plane α-α of the bottom 30.

Such variant allows counteracting and limiting the formation of any air bubbles, which could disturb the impeller reducing its efficiency or altering/compromising its operation.

Figs. 6-10 show a second possible embodiment variant of the tank 1, characterised in that the longitudinal axis of the pump 2 is substantially orthogonal with respect to the lying plane α-α of the bottom 30.

Such variant allows installing the pump 2 vertically, further contributing to reduce the overall dimensions and making more efficient use of the available

spaces.

From the accompanying figures it can be deduced that the tank 1 allows reducing the installation overall dimensions currently provided for the circulation pump.

In particular, according to the arrangement of the components of the dishwasher, said tank 1 allows positioning the pump in unused spaces, further contributing to maximize the use of the available spaces and to maintain a compact arrangement of the components.

In short, the general features of the priming tank according to the present invention may be summarised as follows:

- said tank 1 defines a cavity wherein at least the impeller 20 of a circulation pump 2 is housed;
- said tank is shaped in such a way to offer the impeller 20 a level of water sufficient to guarantee the operation thereof;
- said cavity is in such position to be flooded with the washing water coming from the sump 3, so as to guarantee the optimal suction to said impeller 20;
- at least the pump body 23 of the circulation pump 2 is positioned above the laying plane α-α of the bottom 30 of the said collection sump 3, so as to achieve the advantages shown above.

It is clear that in the practical embodiment of the invention several modifications and further variants may be provided, all falling within the same inventive concept; all the various components and details previously described may also be replaced by technically equivalent elements.

Finally, nothing prevents to apply said tank 1 also to washing machines other than dishwashers, such as washing machines or the like, which require the cooperation between a collection sump and a circulation pump.

CLAIMS

1. Priming or suction tank (1) for washing machines, where said tank (1) comprises a container body (10) adapted to define a cavity where at least an impeller (20) of a circulation pump (2), suitably connected to a collection sump (3) of the washing water, is housed, said container body (10) being provided with at least one coupling sleeve (12), suitably connected to said collection sump (3) by suitable union means (4), and at least one outlet sleeve (13), suitably connected with the washing water circulation system or the discharge system or the like, where:
   - said tank (1) is shaped in such a way to offer said impeller (20) a level of water sufficient to guarantee the operation thereof;
   - said cavity is in such position to be flooded with the washing water coming from the sump (3), so as to guarantee the optimal suction to said impeller (20);
   - at least the pump body (23) of said circulation pump (2) is positioned above the laying plane (α-α) of the bottom (30) of the said collection sump (3);

   characterised in that

   said cavity is divided into two spaces (100; 101) so as to define at least one pre-chamber (100) and at least one priming tank (101).

2. Priming or suction tank (1) according to the previous claim, wherein said tank (1) may comprise at least one divider element (11) suitably placed in said cavity, said divider element (11) being provided with at least one opening (110) and divides said cavity into two spaces (100; 101), so as to define at least one pre-chamber (100) and at least one priming tank (101).

3. Priming or suction tank (1) according to the previous claims, wherein said two spaces (100; 101) are in fluid communication through said opening (110).

4. Priming or suction tank (1) according to the previous claims, wherein said pre-chamber (100) serves as a dumper and equalizer of the water flow, while said priming chamber (101) houses said impeller (20) and is coupled with the inlet section (21) of said pump (2).

5. Priming or suction tank (1) according to the previous claims, wherein said coupling sleeve (12) is placed in the proximity of the base of the container body (10) and is in fluid communication with said pre-chamber (100), while said outlet sleeve (13) is placed in the proximity of the summit zone of said body (10) and is in fluid communication with said priming chamber (101).

6. Priming or suction tank (1) according to the previous claims, wherein said tank (1) allows installing the circulation pump (2) with the longitudinal axis inclined relative to the laying plane (α-α) of the bottom (30) of the said sump (3).

7. Priming or suction tank (1) according to the previous claims 1 to 5, wherein said tank (1) allows installing the circulation pump (2) with the longitudinal axis substantially orthogonal relative to the laying plane (α-α) of the bottom (30) of the said sump (3).

8. Priming or suction tank (1) according to any one of the previous claims, wherein said washing machines comprise dishwashers.

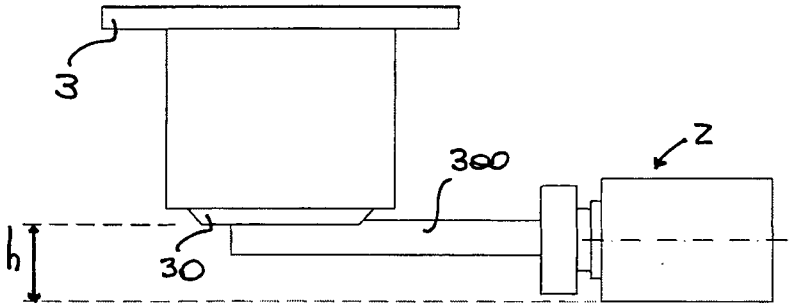


FIG. 1

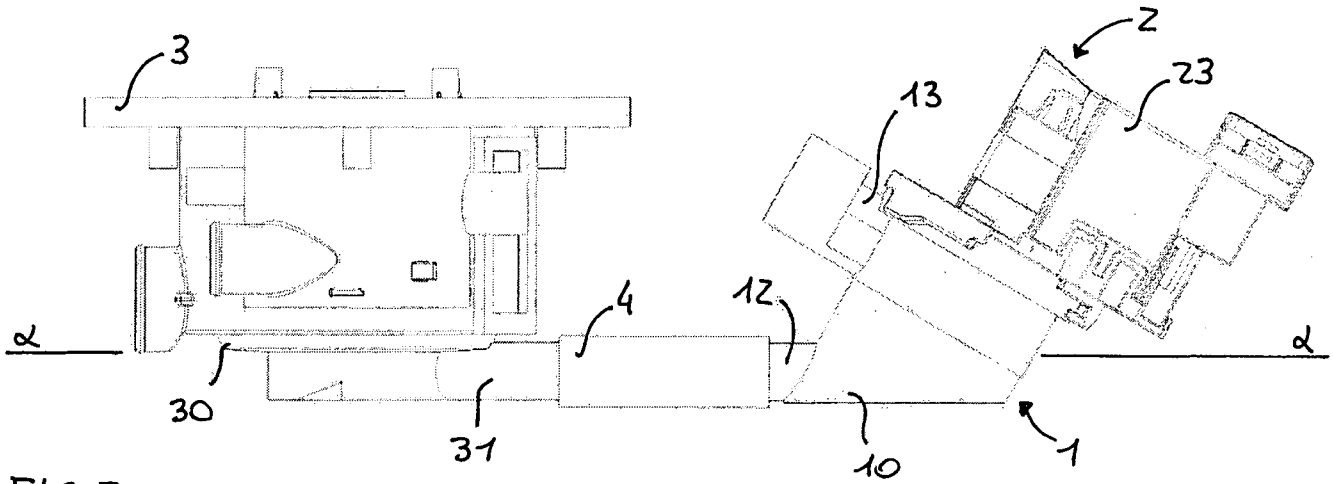


FIG. 2

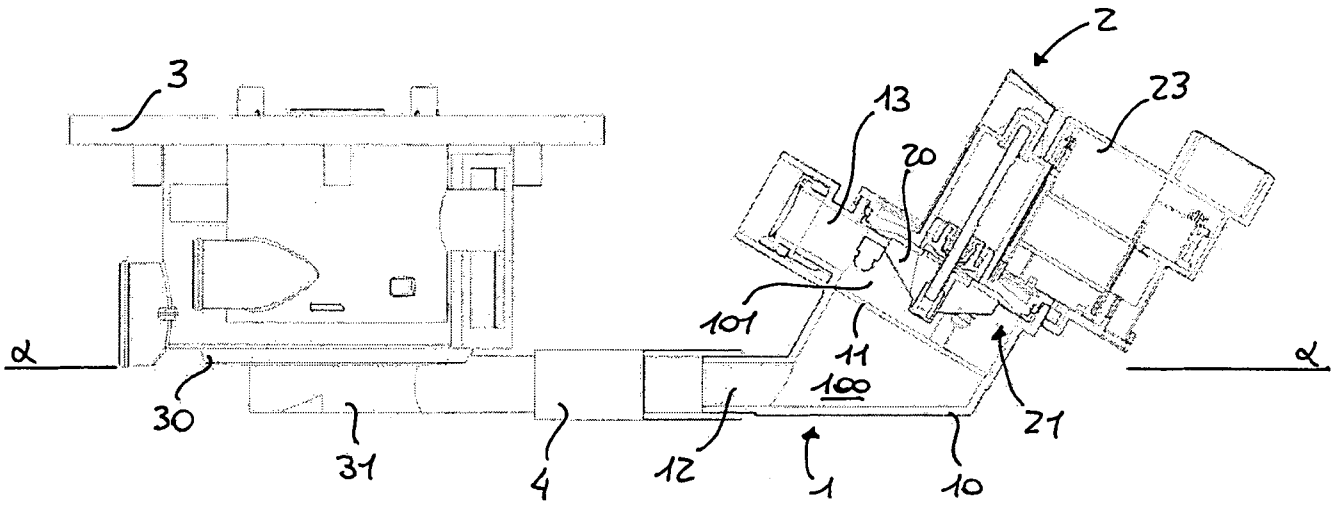


FIG. 3

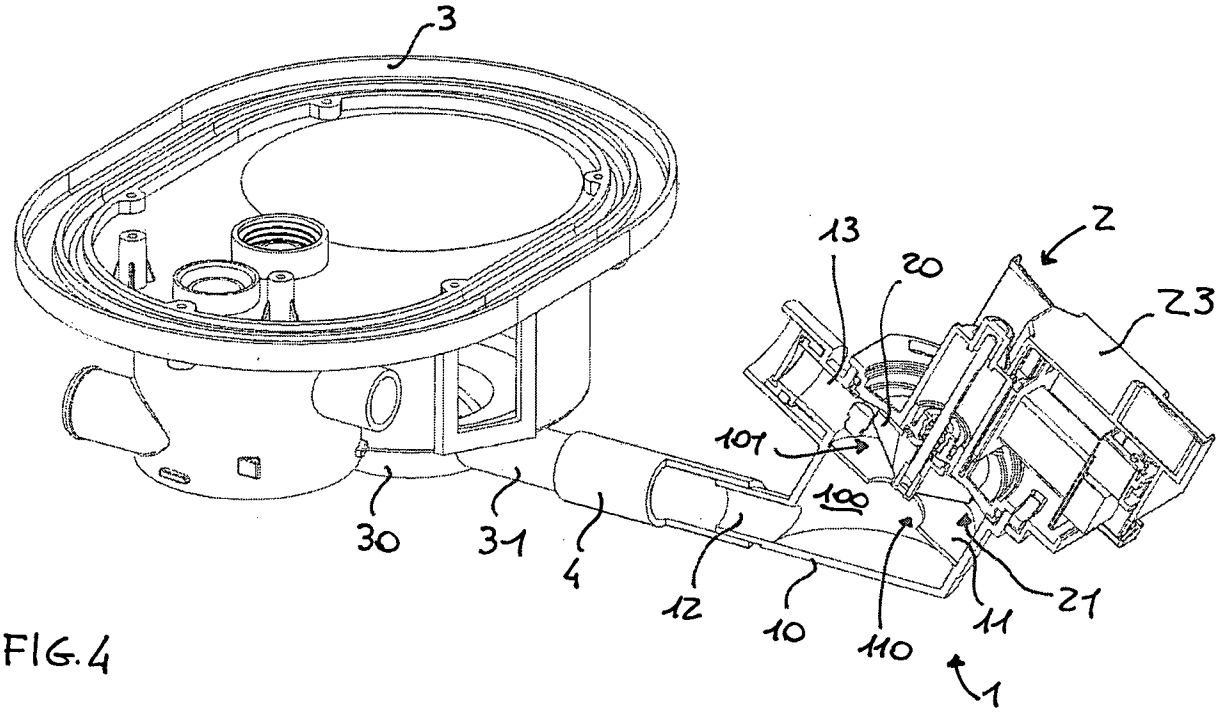

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FIG.4

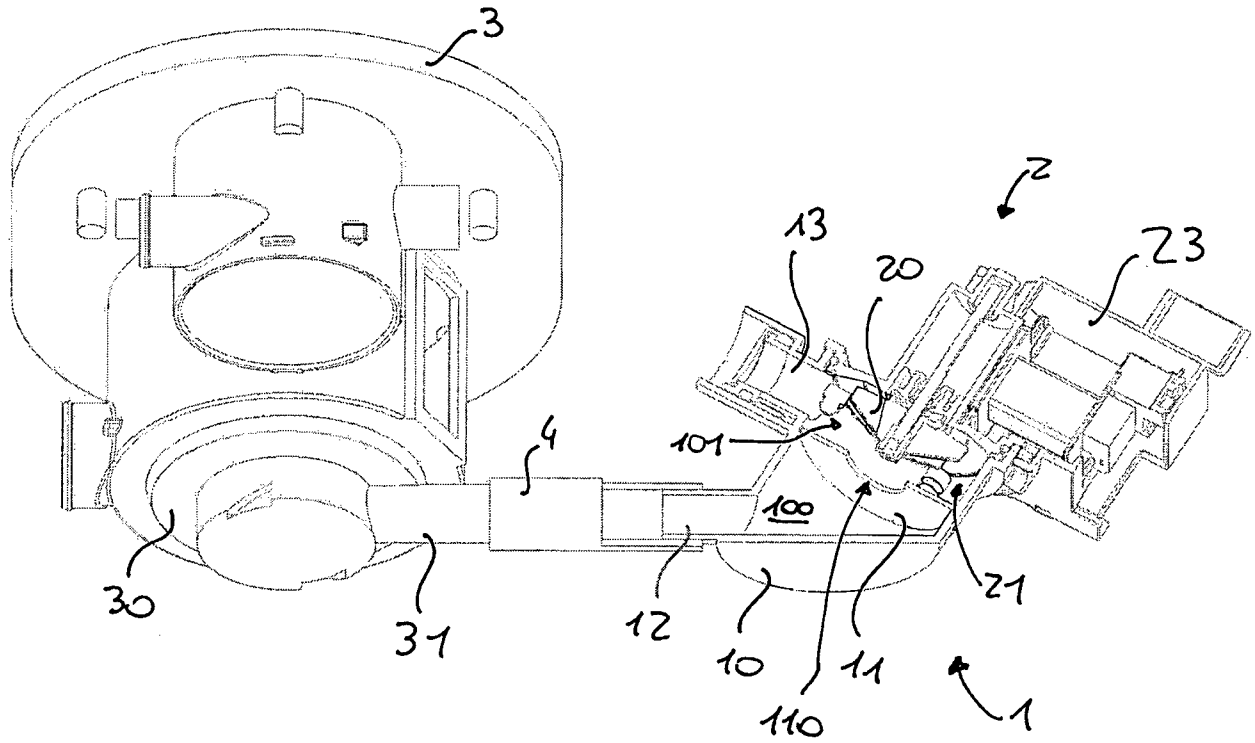

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FIG.5

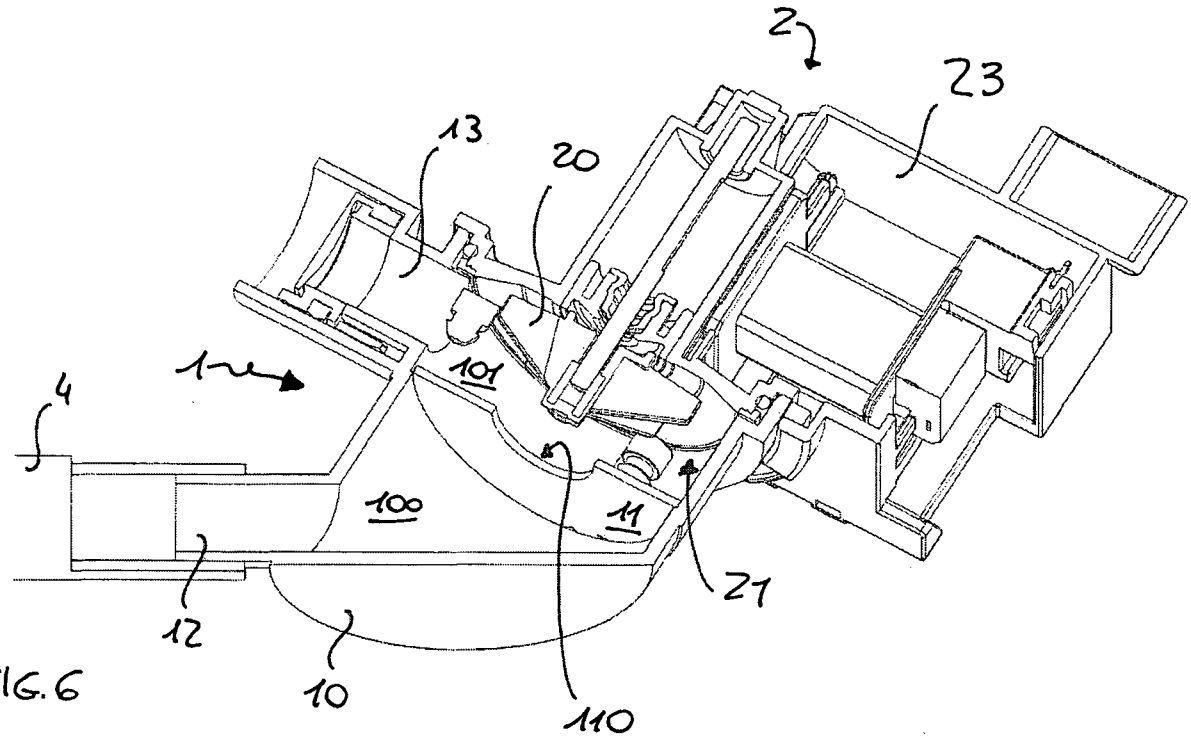


FIG.6

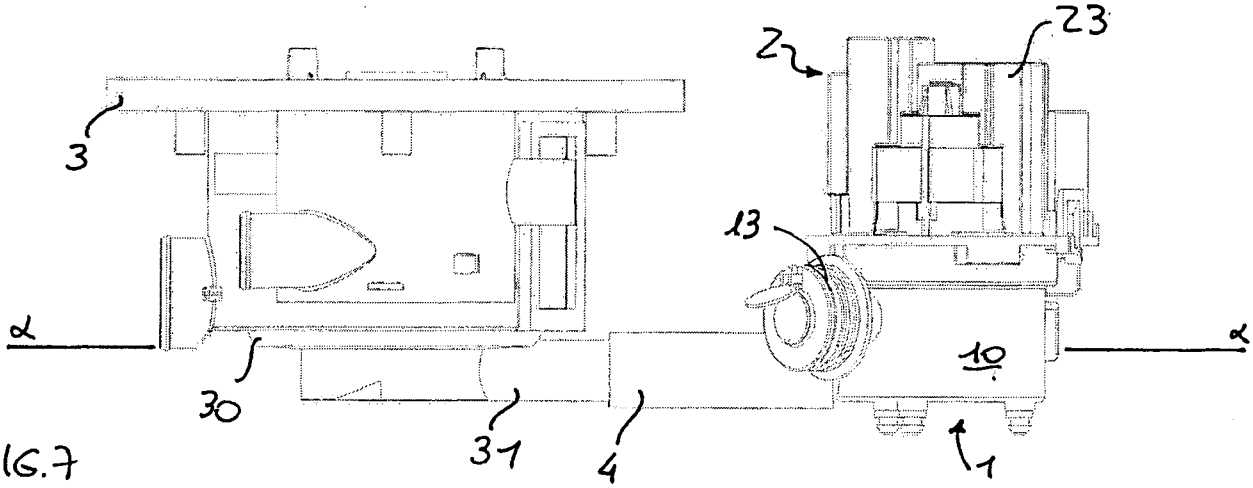


FIG.7

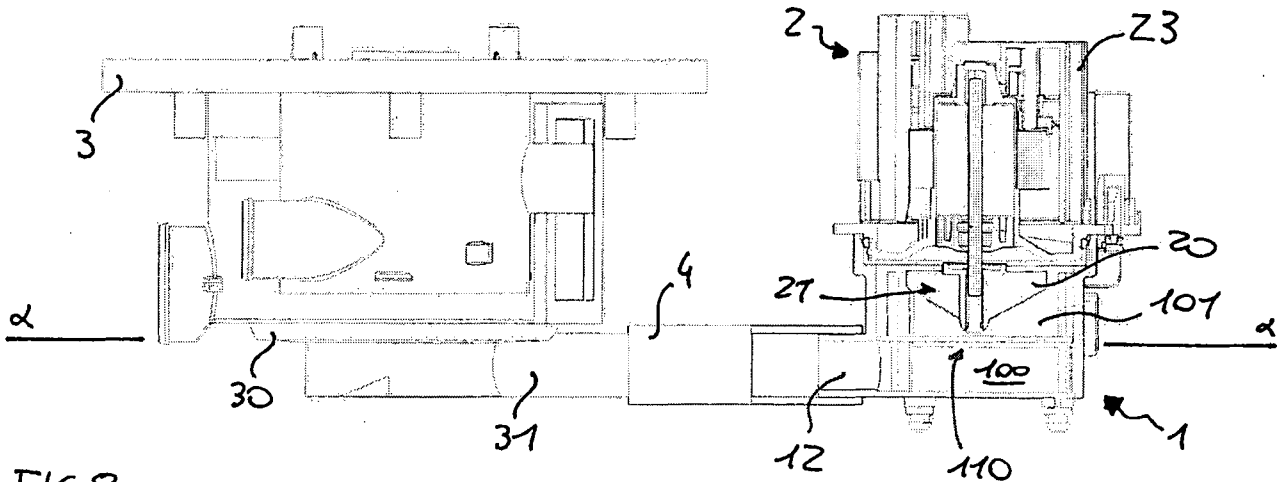


FIG.8

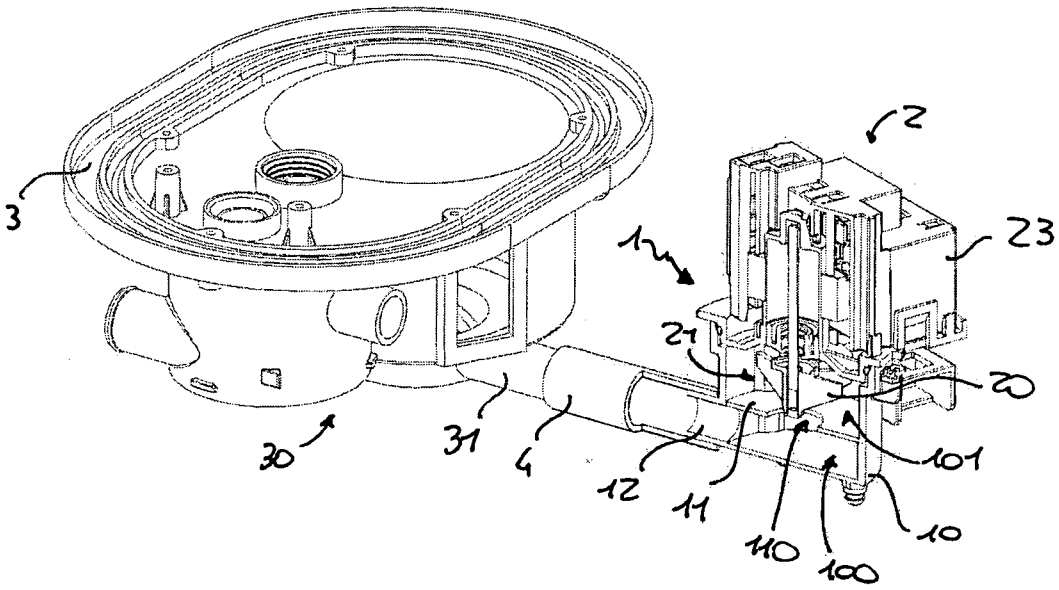


FIG. 9

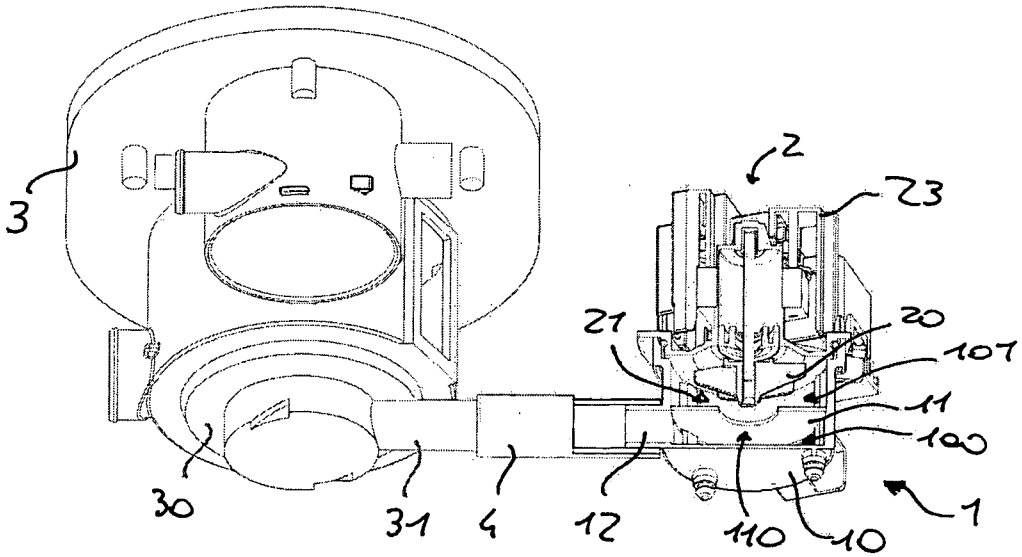


FIG. 10

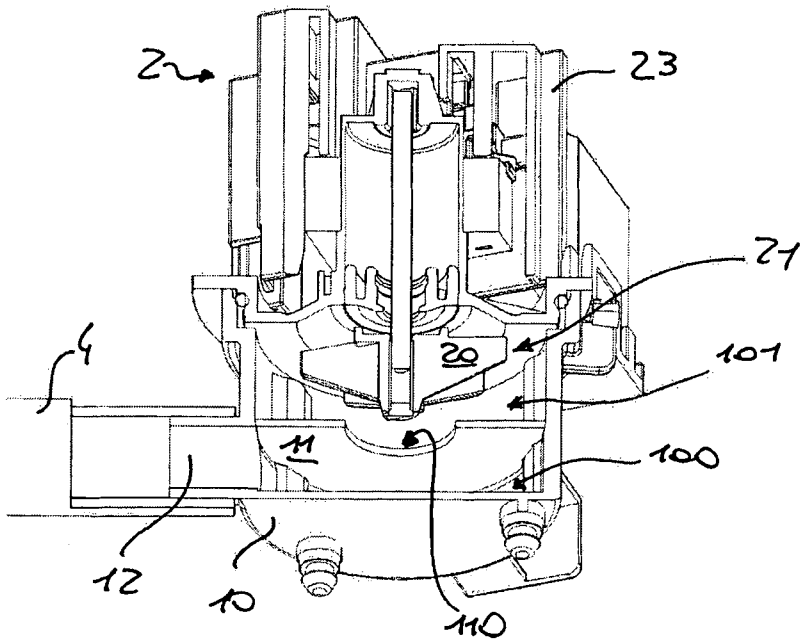


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/000763

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L15/42 D06F39/08
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	FR 2 528 690 A3 (INDESIT [IT]) 23 December 1983 (1983-12-23) page 1, lines 8-22 page 2, lines 25-31 page 3, line 6 - page 4, line 27; figure -----	1-8
A	WO 2016/186437 A1 (LG ELECTRONICS INC [KR]) 24 November 2016 (2016-11-24) page 5, paragraph 56 - page 6, paragraph 64 page 7, paragraph 70-72; figure 1 -----	1-8
A	EP 1 929 924 A1 (ELECTROLUX HOME PROD CORP [BE]) 11 June 2008 (2008-06-11) column 3, paragraph 22 - column 4, paragraph 26; figure 1 ----- -/--	1-8

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

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
14 November 2018	23/11/2018

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	Lodato, Alessandra

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/000763

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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