

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.01.2024 Bulletin 2024/04

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

(21) Application number: **22186560.3**

(52) Cooperative Patent Classification (CPC):
**A47L 15/4221; D06F 39/088; F16K 11/065;
 F16K 31/1221; A47L 15/4223; D06F 39/083**

(22) Date of filing: **22.07.2022**

(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:
KH MA MD TN

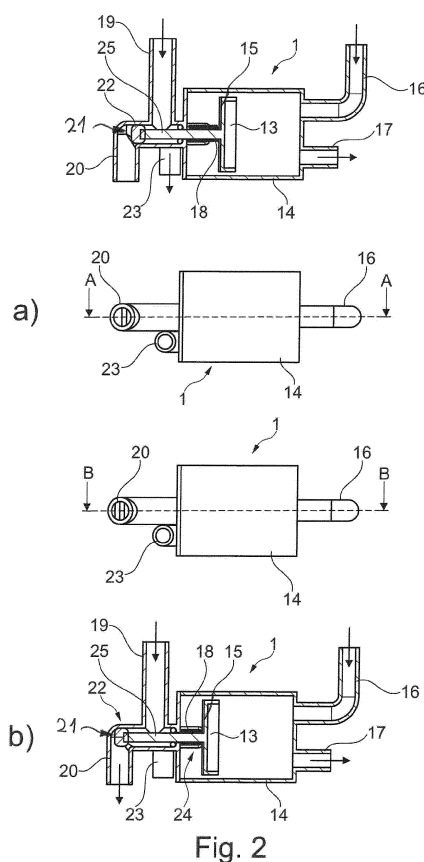
(71) Applicant: **Aweco Polska Appliance Sp. z o.o. sp. k**
43-100 Tychy (PL)

(72) Inventor: **Kobielski, Maciej Jerzy**
40-584 Katowice (PL)

(74) Representative: **Otten, Roth, Dobler & Partner
mbB Patentanwälte
Großtobeler Straße 39
88276 Berg / Ravensburg (DE)**

(54) **HOUSEHOLD MACHINE WITH A FLUID DISTRIBUTOR UNIT**

(57) A household machine, in particular dishwasher, washing machine, beverage dispenser or the like, wherein a fluid distributor unit (1) comprises at least one fluid inlet (16) for the inflow of a fluid and at least one first and one second fluid outlet (20, 23) for the outflow of the fluid and at least one adjustable distributor element (22) for distributing the fluid to the fluid outlets (20, 23), wherein at least one adjusting unit (13, 25) is provided for adjusting the distributor element (22), which at least partially improves the prior art, in particular is more energy-saving and/or more cost-efficient compared to the prior art, and preferably realizes a noise reduction, which improves the comfort for the user. According to the invention, this is achieved in that the adjusting unit (13, 25) has at least one reciprocating piston unit (13, 14, 25) with a reciprocating piston (13) which can be adjusted in a cylinder unit (14).



Description

[0001] The invention relates to a household machine with a fluid distribution unit.

Prior art

[0002] Dishwashers known from prior art generally have two spraying devices or spraying arms to clean the dishes removing or spraying the dirt away. For this purpose, the dishwasher comprises in particular a circulating pump which conveys the rinsing liquid, for example, from the sump of the interior to the spray arms via the reversing device or distributor unit. The spray arms are set in rotation hydraulically by the flowing rinsing liquid.

[0003] DE 101 63 181 A1, for example, describes a distributor or reversing device for a dishwasher, wherein the two outputs of the reversing device can be opened or closed by means of an actuator in such a way that either one of the outputs or a number of outputs or all outputs are opened or closed alternately one after the other and/or continuously. The changeover device has a perforated disc or plate arranged centrally on a rotary axis, which is held parallel to the housing end wall of the changeover device.

[0004] The two outlet nozzles or outlets are guided through the housing end wall. The inlet is essentially parallel to the plane of the perforated disc. By continuously rotating the perforated disk, a flow through corresponding holes is realized in such a way that the rinsing liquid flows from the outlet to one and/or both discharge connections. The perforated disc is driven in particular by an electric motor, with a transmission unit such as a gear train or the like being provided. A disadvantage of such distributors, however, is the comparatively high flow losses.

[0005] In addition, a distributor or reversing device for a dishwasher is known from DE 10 2004 040 423 A1, whereby two or three outlets of the distributor can be controlled or opened and closed by means of a three-dimensionally shaped rotating element rotating about an axis of rotation. The rotating element is also driven by an electric motor.

[0006] A disadvantage of the previous distributors is the electric or electromotive drive for the change of the flow path. On the one hand, corresponding electrical energy must be provided and consumed, and on the other hand, a certain noise level is generated, which increasingly conflicts with the increasing demands for comfort.

Objection and advantages of the invention

[0007] In contrast, it is the object of the invention to propose a household machine, in particular a dishwasher or washing machine, wherein a fluid distribution unit comprises at least one fluid inlet for the inflow of a fluid as well as at least one first and one second fluid outlet for the outflow of the fluid, which at least partially improves the prior art, in particular is more energy-saving and/or

cost-efficient compared to the prior art, as well as preferably realizes a noise reduction, which improves the comfort for the user.

[0008] This technical problem is solved, starting from a household machine of the type mentioned at the outset, by the characterizing features of claim 1. Advantageous embodiments and further embodiments of the invention are implemented using the features of the dependent claims.

[0009] Accordingly, a household machine according to the invention is characterized in that the adjustment unit comprises at least one reciprocating piston unit with a reciprocating piston adjustable in a cylinder unit. The cylinder unit can have any cross-section, but preferably round or elliptical.

[0010] With the aid of this technical features, it is achieved that a hydraulic or pneumatic distribution of the fluid, in particular of the service water, can be implemented. Accordingly, no separate electrical drive source is required for the distribution of the fluid, in particular the water. This not only saves electrical energy, but also effectively reduces noise. This improves the environmental balance of the household machine and also increases the comfort for the user.

[0011] In an advantageous embodiment of the invention, a working pressure of a working fluid, esp. a working water, can be used to pressurize the reciprocating piston unit and/or the adjustable reciprocating piston. For example, a changing or a variable fluid/water pressure of the fluid and/or a machine/water port of the household machine is used to implement pressurization of the reciprocating piston unit and/or the adjustable reciprocating piston according to the invention.

[0012] Where applicable, at least one pressure control valve and/or inlet valve or variable flow feed means or the like is advantageously provided. This advantageous valve can be formed for changing the pressure of the fluid or water. Here, this fluid or water can flow into the machine with a variable or changed pressure, for example with the so-called line or tap pressure, and/or flow within the machine in order to get the distribution according to the invention. For example, the valve is designed as a bistable valve or, for example, 3/2-way valve with pressure changeability.

[0013] Preferably, at least one pressure pump unit is provided for pressurizing the fluid and/or the fluid inlet and/or the reciprocating piston. Hereby, a certain dependence of the line or tap pressure of the aforementioned variant of the invention can be reduced or eliminated. Thus, a more precise and/or unambiguous and/or comparatively large pressure change and thus defined change of the fluid distribution according to the invention can be implemented. This increases the operational safety.

[0014] Advantageously, the pressure pump unit is designed as a water pump for the household machine. Hereby, an advantageous double/multiple use of the water pump or circulating pump, sump pump or the like al-

ready existing for other purposes or functionalities can be implemented, but not only to reduce the costs for manufacturing the machine, but also for operating the machine. In addition, this dual or multiple use also eliminates further noise and allows existing control and/or supply components of the pump to be used, which is of particular advantage.

[0015] Preferably, a piston rod of the reciprocating piston and/or the reciprocating piston unit is formed as an adjusting element of the distributor element, wherein the reciprocating piston is arranged at a first end portion of the piston rod. For example, the distributor element is designed as a valve with a valve seat and/or the adjustment element is designed as a valve rod of the valve. Hereby, the design complexity is reduced.

[0016] In a particular further development of the invention, the valve seat of the valve is arranged at a second end portion of the piston rod and/or the valve rod of the valve, wherein the first and second end portions are arranged at opposite ends of the piston rod, wherein the first end portion of the piston rod is formed as a first end portion of the valve rod of the valve. Hereby, an advantageous dual use of the piston rod as a valve rod is implemented, reducing cost and effort.

[0017] Advantageously, the fluid distribution unit comprises at least one bypass line for bypassing the distribution element and/or for direct conduction of the fluid from the fluid inlet and/or to the first or second fluid outlet. Preferably, the bypass line is arranged between the cylinder unit and the valve. Hereby, an advantageous control or control of the fluid and thus of the distribution can be reached.

[0018] In a preferred embodiment, at least one spring element is provided for controlling and/or resetting the reciprocating piston. A spring element, for example a spring element with a piston-moulded geometry or preferably a spiral spring and/or metal spring, can be advantageously adjusted to the force conditions and/or space conditions, which increases the operational safety and improves the integrity as well as the controllability or control of the distribution or switching of the distributor unit.

[0019] Preferably, at least one piston guide element is provided for guiding the reciprocating piston. This improves the adjustment or operational reliability of the distribution. In addition, the service life is extended. Advantageously, the piston guide element is designed as a valve seat and/or as a guide element arranged on the side opposite the valve seat. Hereby, an advantageous double/multiple use valve seat can be implemented. This not only reduces the costs for manufacturing, but also for operating the machine.

[0020] In an advantageous embodiment of the invention, a hydraulic bypass valve is designed as a distributor unit, which is actuated by the change in water pressure or the correspondingly resulting from a changed flow rate of the fluid, in particular of the water, at the inlet.

[0021] Advantageously, when operating at low pressure/flow, the pressure generated in an advantageous

manner on a spring-loaded loose piston, is below an advantageous threshold or limit parameter of the distributor unit or bypass activation position, which excludes the valve or advantageous piston silicone seal from bypass operation. The fluid or water flows completely through the second outlet port or so-called nominal outlet port.

[0022] When operating at high pressure/flow, the head pressure generated on the spring-loaded loose piston exceeds the advantageous threshold or limit parameter of the manifold unit or its spring force, resulting in the second outlet port or nominal outlet being closed by the rubber/seal of the piston and opening the piston/seal in the end geometry. The fluid/water flows completely through the bypass or a first outlet port.

[0023] In principle, it is possible to integrate the outlet of the bypass as a nominal outlet. It can also be a separate part so that, for example, the bypass seal is used as a fluid/water outlet valve. In this case, an NRV should be used in the bypass design, i.e., gravity and pressure silicone plug. But in this case, the regeneration circuit could be separated from the nominal circuit without the need for additional valves. Hereby, higher cost efficiency of the system is achieved.

[0024] In general, the spring-loaded piston advantageously converts the mechanical or potential energy of the fluid/water into a linear position change or adjustment. When a threshold value derived from the geometry is reached, the first outlet port is closed and the second outlet port is opened or becomes a water path.

Example of embodiment

[0025] An embodiment example of the invention is shown in the drawing and is explained in more detail below with reference to the figures.

[0026] In detail shows:

Figure 1 schematic hydraulic diagrams of three different applications of a distribution unit in household machines, preferably dishwashers, according to the invention,

Figure 2 schematic representations of a first distributor unit according to the invention in the activated and in the non-activated operating state, and

Figure 3 schematic representations of a second distributor unit according to the invention in the activated and in the non-activated operating state.

[0027] In Figure 1, three different application cases of a distributor unit 1 of a household machine according to the invention are shown schematically. In principle, dishwashers (cf. Figure 1 a) and b)), washing machines, softeners, coffee machines, ice crushers separately or integrated in a refrigerator/freezer, or the like are possible

household machines.

[0028] Dishwashers usually have two separate rotating arms 2 or spray arms 2. Their water or rinse water is distributed or fed to the spray arms 2 by means of the distributor unit 1. The distributor unit 1 serves here as a diverter valve which is actuated hydraulically (cf. Figure 1 b)).

[0029] Thus, by means of a circulation pump 3, the pressure of the water for the spray arms 2 actuates the distributor unit 1. For example, the water is supplied to the lower spray arm 2 at a low pressure and to the upper spray arm 2 at a high pressure.

[0030] Consequently, the distributor unit 1 of the variant according to Figure 1 b) does not require a separate actuator, in particular an electric drive motor. Rather, the already existing electric pump motor of the circulation pump 3 is used twice. Accordingly, the electric/electronic control of the pump motor is used or can be used twice. This reduces the effort and the costs to a considerable extent.

[0031] According to Figure 1 a) of a second variant of the invention, a distributor unit 1 according to the invention is used for the distribution of the so-called collection water or sump water for a heat exchanger 4. Here, the service water is supplied to the heat exchanger 4 on the one hand and to an outlet 5 on the other hand, depending on the pressurization of the distributor unit 1. Similar to the aforementioned variant, however, a so-called waste water or sump pump 6 is used here for pressurization and dual use. It is not shown on the drawings, however, the principle can also be used for not only recirculation in heat pumps, but also in water recycling for a water-reuse container.

[0032] This household machine has a softener 7, the soft water of which can be preheated in an advantageous manner with the above-mentioned heat exchanger. For the softening and regeneration of the softener 7, a salt container 8 and a so-called regeneration reservoir 9 as well as various valves are provided in a known manner (cf. Figure 1 a) and b)). However, the variant according to figure 1 b) does not have any heat exchanger 7.

[0033] In contrast to the two aforementioned variants, the third variant according to Figure 1 c) does not have a pressure pump for pressurizing the distributor unit 1, but an inlet valve 10 with variable flow or pressure. Thus, the water of a machine inlet 12, which has a so-called line pressure, can be influenced in such a way that in the direction of flow downstream of the valve 12 the pressure of the inlet water is variable, so that the distributor unit 1 according to Figure 1 c) can be pressurized with a higher and a lower pressure accordingly. This illustrated third variant can also be used or installed in an advantageous manner either in a dishwasher or, for example, in a softener or a coffee machine, etc.

[0034] In Figures 2 and 3, two different distributor units 1 according to the invention are shown in section and in plan view. Here, Figures 2 a) and 3 a) show the so-called non-activated state and Figures 2 b) and 3 b) show the

so-called activated state.

[0035] The distributor unit 1 comprises a stroke piston 13, which is adjustably mounted within a cylinder 14 along a stroke path or adjustment path. Here, a seal 15 or an O-ring 15 is provided for sealing. If water now flows through an inlet 16 into the cylinder 14 or the pressure chamber, the piston 13 is pressurized or subject to dynamic flow forces. In the case of a comparatively low pressure, the piston 13 is not adjusted or insufficiently adjusted (see Figure 2 a)). For this purpose, a spring 18 is also provided in an advantageous manner, which, among other things, applies a counterforce.

[0036] Thus, the water flows out of the pressure chamber of the cylinder by means of an outlet 17 of the distributor unit 1 and, without being shown in more detail, via a bypass to an inlet 19 of the distributor unit 1. However, a valve 21 or its valve seat 22 closes an outlet 20 of the distributor unit 1 according to the non-activated position of Figure 2 a). Thus, the water flows further out of the distributor unit 1 from a further outlet 23, e.g. to a lower spray arm 2 (without being shown in more detail) .

[0037] At a high or higher pressure, whereby the spring 18 is compressed (cf. Figure 2 b)), the piston 13 is displaced along the stroke path and advantageously strikes the cylinder base or a stop 24. Through this, a piston rod 25 of the piston 13 is displaced, which at the same time forms the valve rod 25 for the valve seat 22, so that the outlet 20 is opened or activated and water can flow out of the piston cylinder via bypass 17 to inlet 19 and further to outlet 20, for example, to an upper spray arm 2.

[0038] In a second variant of the distributor unit 1 according to Figure 3, functionally similar components are labeled with the same reference signs of Figure 2. This variant has a particularly compact and space-saving design, which is of particular advantage in household machines.

[0039] In addition, this 2nd variant has a guide 26 or guide element, which is designed here as an extension of the piston rod 25 and is in operative connection with a receiving element 27. This provides an advantageously stable guide for the piston 13 or the piston rod 25.

Claims

1. Household machine, in particular dishwasher, washing machine, beverage dispenser or the like, wherein a fluid distributor unit (1) comprises at least one fluid inlet (16) for the inflow of a fluid and at least one first and one second fluid outlet (20, 23) for the outflow of the fluid and at least one adjustable distributor element (22) for distributing the fluid to the fluid outlets (20, 23), wherein at least one adjusting unit (13, 25) is provided for adjusting the distributor element (22), **characterized in that** the adjusting unit (13, 25) has at least one reciprocating piston unit (13, 14, 25) with a reciprocating piston (13) which can be adjusted in a cylinder unit (14).

2. Household machine according to claim 1, **characterized in that** a piston rod (25) of the reciprocating piston (13) and/or of the reciprocating piston unit is designed as an adjusting element (25) of the distributor element (22), the reciprocating piston (13) being arranged at a first end section of the piston rod (25). 5
3. Household machine according to at least one of the aforementioned claims, **characterized in that** the distributor element (22) is designed as a valve (22) with a valve seat and/or the adjusting element (25) is designed as a valve rod (25) of the valve. 10
4. Household machine according to at least one of the aforementioned claims, **characterized in that** the valve seat of the valve (22) is arranged at a second end portion of the piston rod (25) and/or the valve rod (25) of the valve (22), the first and second end portions being arranged at opposite ends of the piston rod (25), the first end portion of the piston rod being formed as a first end portion of the valve rod (25) of the valve (22) . 15
20
5. Household machine according to at least one of the aforementioned claims, **characterized in that** the fluid distributor unit (1) comprises at least one bypass line for bypassing the distributor element (22) and/or for direct conduction of the fluid from the fluid inlet (16) and/or to the first or second fluid outlet (20, 23). 25
30
6. Household machine according to at least one of the aforementioned claims, **characterized in that** the bypass line is arranged partially or fully between the cylinder unit (14) and the valve (22). 35
7. Household machine according to one of the aforementioned claims, **characterized in that** at least one spring element (18) is provided for controlling and/or resetting the reciprocating piston (13). 40
8. Household machine according to at least one of the aforementioned claims, **characterized in that** at least one piston guide element (26) is provided for guiding the reciprocating piston (13). 45
9. Household machine according to at least one of the aforementioned claims, **characterized in that** the piston guide element (26) is designed as a valve seat (22) and/or as a guide element (26) arranged on the side opposite the valve seat (22). 50
10. Household machine according to at least one of the aforementioned claims, **characterized in that** at least one pressure pump unit (3, 6) is provided for pressurizing the fluid and/or the fluid inlet (16) and/or the reciprocating piston (13). 55
11. Household machine according to at least one of the

aforementioned claims, **characterized in that** the pressure pump unit (3, 6) is designed as a water pump (3, 6) of the household machine.

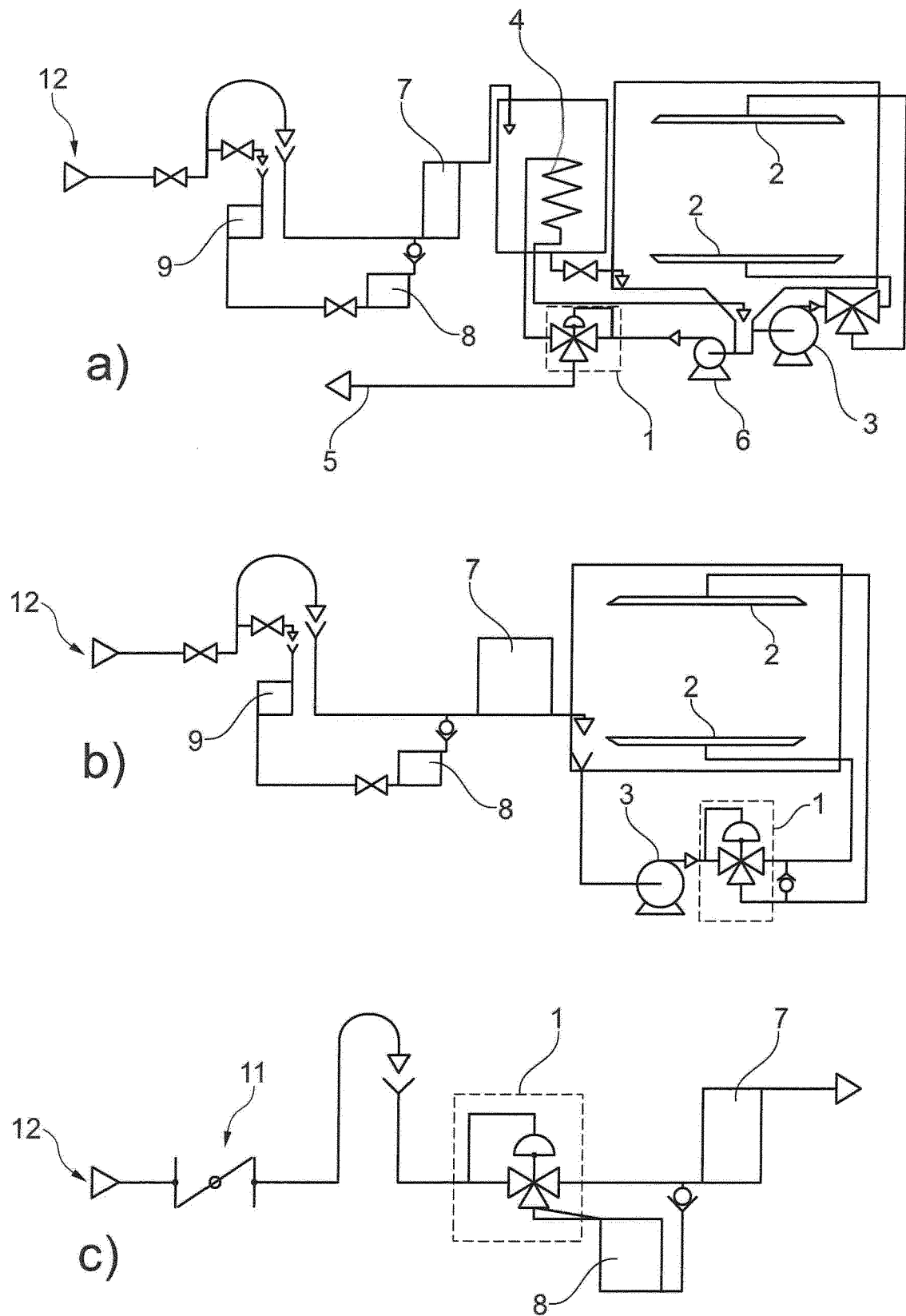


Fig. 1

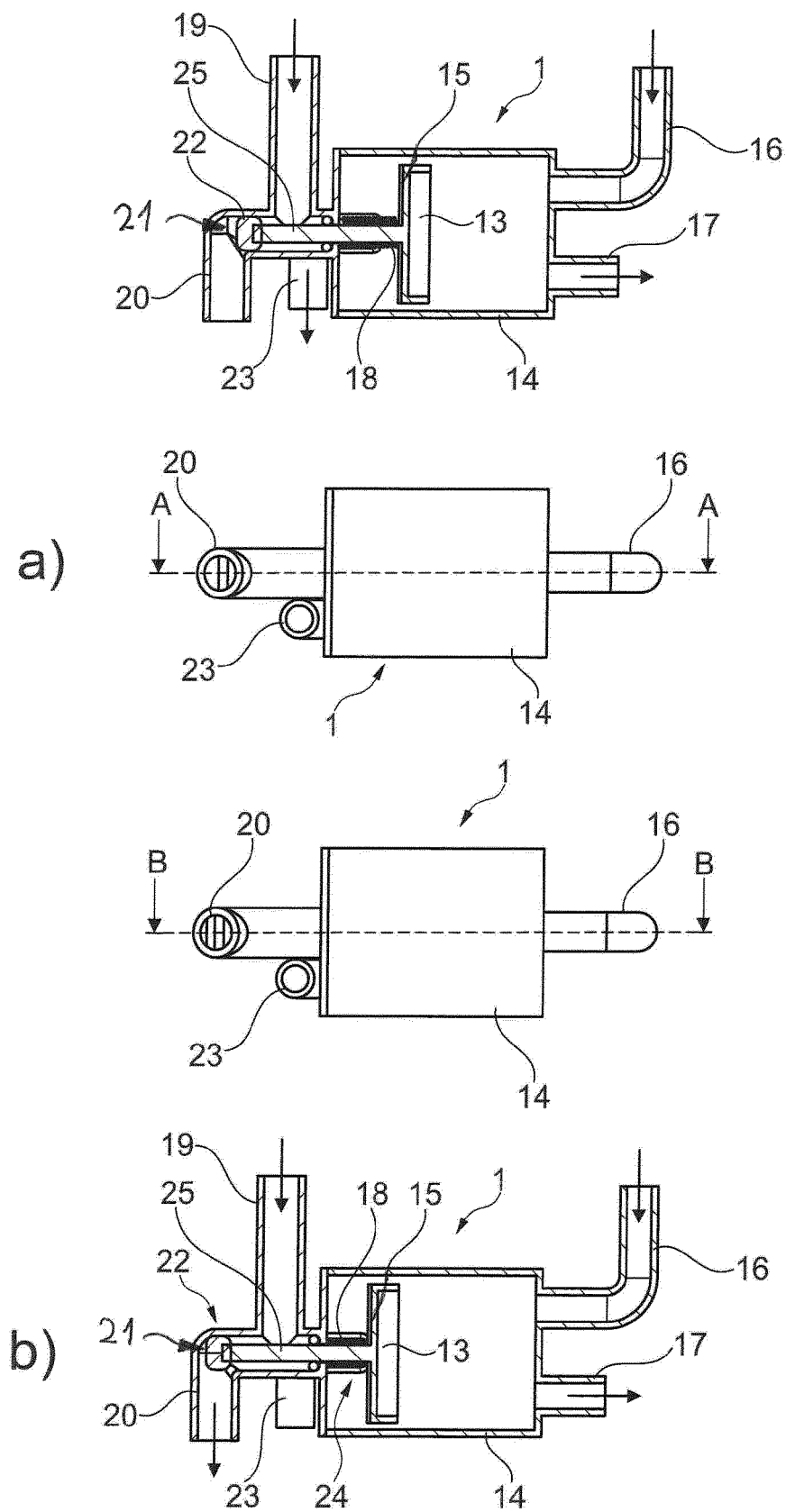


Fig. 2

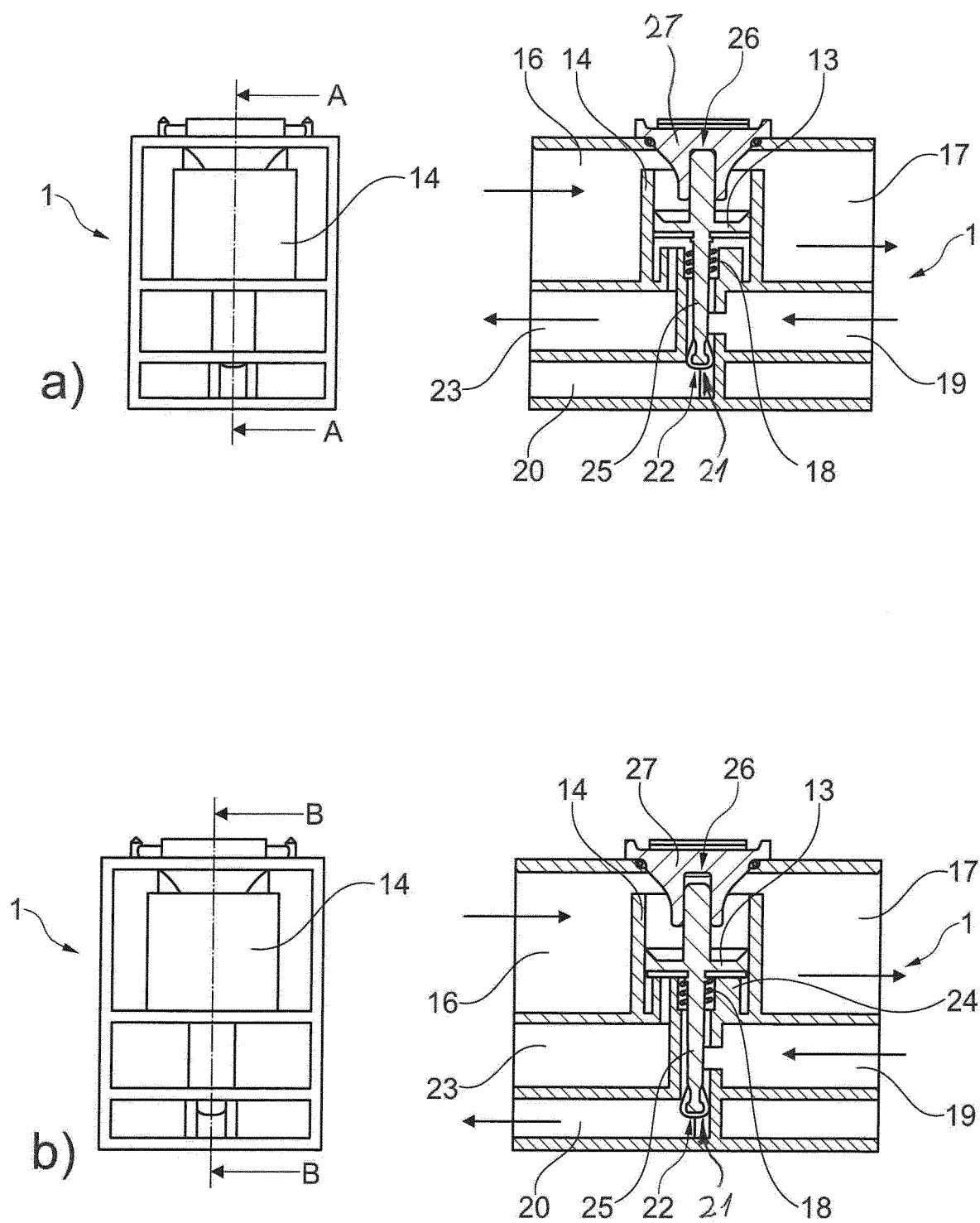


Fig. 3



EUROPEAN SEARCH REPORT

Application Number

EP 22 18 6560

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 A	EP 0 547 011 A1 (COLGED S R L [IT]) 16 June 1993 (1993-06-16) * figures 1-2 *	1-3, 5, 8, 10, 11 6	INV. A47L15/42 D06F39/08
X	GB 661 124 A (ELECTROLUX AB) 14 November 1951 (1951-11-14) * figure 1 * * claim 1 *	1-5, 8, 9	
X	DE 25 42 393 A1 (MARTIN USINES FONDERIE ARTHUR) 1 April 1976 (1976-04-01) * figures 1, 9-12 * * claim 1 *	1-3, 7, 8, 10, 11	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L D06F
The present search report has been drawn up for all claims			

1

EPO FORM 1503 03.82 (P04C01)

Place of search Munich	Date of completion of the search 11 January 2023	Examiner Werner, Christopher
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		

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

EP 22 18 6560

5 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.

11-01-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0547011 A1	16-06-1993	DE 69217629 T2	02-10-1997
		EP 0547011 A1	16-06-1993
		ES 2100330 T3	16-06-1997
		IT 1252886 B	04-07-1995
GB 661124 A	14-11-1951	DE 939834 C	01-03-1956
		GB 661124 A	14-11-1951
DE 2542393 A1	01-04-1976	DE 2542393 A1	01-04-1976
		FR 2285487 A1	16-04-1976
		IT 1042741 B	30-01-1980

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

- DE 10163181 A1 [0003]
- DE 102004040423 A1 [0005]