

(19)



(11)

EP 4 545 697 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.04.2025 Bulletin 2025/18

(51) International Patent Classification (IPC):
D06F 39/08 ^(2006.01) **D06F 25/00** ^(2006.01)
D06F 39/02 ^(2006.01)

(21) Application number: **24207826.9**

(52) Cooperative Patent Classification (CPC):
D06F 39/088; **D06F 25/00**; **D06F 39/028**

(22) Date of filing: **21.10.2024**

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

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(30) Priority: **26.10.2023 IT 202300022512**

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(54) WATER CONDUCTING SYSTEM FOR A WASHING MACHINE OR WASHER-DRYER

(57) A water conducting system (1) with a first electric valve (3) having a valve outlet (6), a main conduit (8) connected to the valve outlet (6) to receive a main flow (9), a secondary conduit (10) branching from the main conduit (8), to receive a secondary flow (12), a buffer container section (13) formed in the main conduit (8) downstream of the branching in a buffer position (14) higher than the secondary conduit (10), an electronic control system (15) controlling and switching the supply valve (3) to an OFF mode without supply of the valve

outlet (6), to a main mode, in which it continuously supplies the valve outlet (6) to supply a main use (16) downstream of the buffer container section (13), and to a secondary mode, in which it intermittently supplies the valve outlet (6) with flow intervals alternating with interruption intervals, to partially fill the buffer container section first and then empty it due to the effect of gravity in the opposite direction, through the branching, into the secondary conduit (10) to supply the secondary flow (12) towards a secondary use (17).

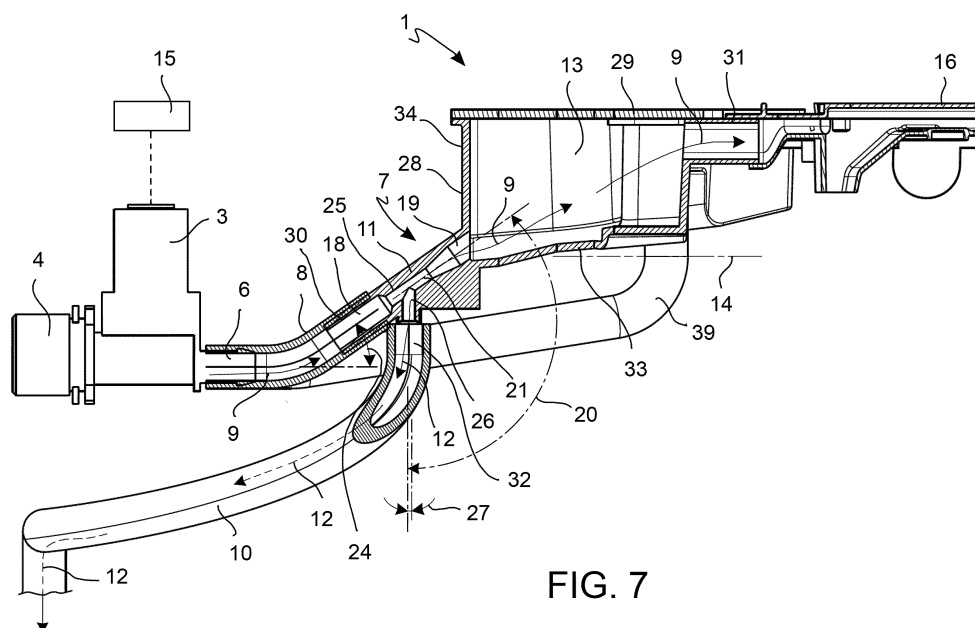


FIG. 7

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Description

[0001] The present invention relates to a water conducting system for the controlled supply of a plurality of conduits, as well as to a water-conducting household appliance, in particular a domestic washing machine and washer-dryer.

[0002] As is known, domestic washing machines and washer-dryers comprise a very complex and expensive hydraulic structure, with an undesirably high number of electric valves, or with electric valves with multiple outlets, for example three-way electric valves, in particular, but not exclusively, for the following functions and combinations of functions:

- supply of pre-washing water,
- supply of washing water,
- supply of water and fabric softeners,
- supply of cooling water to the heat exchanger for condensing humidity during the laundry drying step,
- supply of water to the steam generator during the laundry steam treatment step.

[0003] It is the object of the present invention to provide a water conducting system for the controlled supply of a plurality of supply conduits or paths, as well as a water-conducting household appliance, in particular a domestic washing machine or washer-dryer, having features such as to reduce the number of hydraulic components, in particular the number of electric valves and/or to reduce the number of outlets of multi-way electric valves.

[0004] This and other objects are achieved by a water conducting system according to claim 1 and by a water-conducting household appliance according to claim 14. Some advantageous embodiments are the subject of the dependent claims.

Summary of the invention

[0005] According to an aspect of the invention, a water conducting system for the controlled supply of a plurality of conduits, for example in a water-conducting household appliance, comprises:

A) a first supply electric valve having:

- a first valve inlet connectable to a mains water system, and
- at least a first valve outlet,

wherein the first supply electric valve is controllable to selectively supply water to said first valve outlet,

B) at least a first conduit system, comprising:

- a first main conduit connected to the first valve outlet to receive and conduct a first main flow,
- a first secondary conduit branching from the first main conduit, transversely and/or in the oppo-

site direction with respect to the direction of the first main flow, in a first branching section downstream of the first valve outlet, to receive and conduct a first secondary flow,

- a first buffer container section formed in the first main conduit downstream of the first branching section in a buffer position higher than the extension of the first secondary conduit,

C) an electronic control system controlling the first supply valve and configured to switch the first supply valve:

C1OFF) in a first OFF mode without supply of the first main flow,

C1P) in a first main supply mode, wherein it continuously supplies the first main flow to supply a first main use downstream of the first buffer container section, wherein the transverse branching orientation of the first secondary conduit from the first main conduit and/or the branching orientation of the first secondary conduit in the opposite direction with respect to the direction of the first main flow limits a branching of a partial flow from the first main flow into the first secondary conduit,

C1S) in a first secondary supply mode, in which it supplies the first main flow intermittently or interrupted with:

- one or more flow intervals, until at least partially filling the first buffer container section, without the first main flow reaching said first main use, and
- one or more flow interruption intervals, wherein, due to the effect of gravity, a back-flow is established from the first buffer container section through the first branching section into the first secondary conduit to supply the first secondary flow towards a first secondary use downstream of the first secondary conduit.

[0006] This new hydraulic and control configuration allows supplying a greater number of conduits and functions with a smaller number of supply electric valves and/or with multi-way electric valves with a smaller number of outlets. This reduces the manufacturing cost of the water conducting system and of the household appliance in which it is implemented.

[0007] The invention further relates to a water-conducting household appliance, in particular a washing machine or washer-dryer, comprising the water conducting system.

Brief description of the Figures

[0008] In order to better understand the invention and

appreciate the advantages thereof, some non-limiting embodiments thereof will be described below by way of non-limiting example with reference to the drawings, in which:

Figure 1 shows a perspective view of a water-conducting household appliance, in particular a washer-dryer, according to an embodiment, Figures 2, 3 are front-side (Figure 2) and bottom (Figure 3) perspective views of the washer-dryer in Figure 1, with an external housing removed, Figure 4 is a perspective view of the washer-dryer with some parts removed to make some features of a drying system more visible, Figure 5 is a perspective view of a water conducting system of the washer-dryer in Figure 2, Figure 6 is a top view of the water conducting system in Figure 5, Figure 7 is a side and sectional view of the water conducting system in Figure 5, Figure 8 is a schematic representation of a water conducting system according to the invention.

Description of embodiments of the water conducting system 1

[0009] With reference to the Figures, a water conducting system 1 for the controlled supply of a plurality of conduits, for example in a water-conducting household appliance 2, comprises:

A) a first supply electric valve 3 having:

- a first valve inlet 4 connectable to a mains water system 5, and
- at least a first valve outlet 6,

wherein the first supply electric valve 3 is controllable to selectively supply water to said first valve outlet 6,

B) at least a first conduit system 7, comprising:

- a first main conduit 8 connected to the first valve outlet 6 to receive and conduct a first main flow 9,
- a first secondary conduit 10 branching from the first main conduit 8, transversely and/or in the opposite direction with respect to the direction of the first main flow 9, in a first branching section 11 downstream of the first valve outlet 6, to receive and conduct a first secondary flow 12,
- a first buffer container section 13 formed in the first main conduit 8 downstream of the first branching section 11 in a buffer position 14 higher than the first secondary conduit 10, wherein the first conduit system 7 together with the first supply electric valve 3 forms a first multiple conduction assembly 42

C) an electronic control system 15 controlling the first

supply valve 3 and configured to switch the first supply valve 3, i.e., the first multiple conduction assembly 42:

C1OFF) to a first OFF mode without supply of the first valve outlet 6, C1P) in a first main mode, wherein it continuously supplies the first valve outlet 6 to supply a first main use 16 downstream of the first buffer container section 13, wherein the transverse branching orientation of the first secondary conduit 10 from the first main conduit 8 and/or the branching orientation of the first secondary conduit 10 in the opposite direction with respect to the direction of the first main flow 9 limits a branching of a partial flow from the first main flow 9 into the first secondary conduit 10, C1.1S) to a first secondary mode, in which it intermittently supplies the first valve outlet 6 with:

- one or more flow intervals, until at least partially filling the first buffer container section 13, without the first main flow 9 reaching said first main use 16, alternating with
- one or more interruption intervals without supply of the first valve outlet 6, wherein, due to the effect of gravity, a back-flow is established from the first buffer container section 13 through the first branching section 11 into the first secondary conduit 10 to supply the first secondary flow 12 towards a first secondary use 17 downstream of the first secondary conduit 10.

[0010] This new hydraulic and control configuration allows supplying a greater number of conduits and functions with a smaller number of supply electric valves and/or with multi-way electric valves with a smaller number of outlets. This reduces the manufacturing cost of the water conducting system and of the household appliance in which it is implemented.

Detailed description of the first branching section 11

[0011] According to an embodiment (Figure 7), the first main conduit 8 forms an inlet segment 18 in the first branching section 11 and an outlet segment 19 from the first branching section 11, substantially (straight and) aligned with each other or having an angular misalignment of less than 45°, preferably less than 15°, seen in the direction of the first main flow 9.

[0012] At the first branching section 11, the first secondary conduit 10 has an angular misalignment 20 greater than 90° with respect to the inlet segment 18, seen in the direction of the first main flow 9,

[0013] The angular misalignment between the first

secondary conduit 10 and the inlet segment 18 prevents or limits a branching of a partial flow from the first main flow 9 into the first secondary conduit 10.

[0014] According to an embodiment (Figure 7), the first main conduit 8 forms a constriction 21 at the first branching section 11 so that the first main flow 9, acting as a driving flow, generates a Venturi suction effect on the first secondary conduit 10. The Venturi effect prevents or further limits a branching of a partial flow from the first main flow 9 into the first secondary conduit 10.

[0015] When switching from the first main mode C1P to the first OFF mode C1OFF of the first supply valve 3, an emptying of the first buffer container section 13, and therefore a residue of the first secondary flow 12, may occur. In many circumstances, depending on the type of first secondary use 17 (for example, a water heat exchanger of a washer-dryer condenser or a water container of a steam generator, etc.), such residue of the first secondary flow 12 is tolerable without any negative effect.

Description of the device for preventing back-flow and air gaps

[0016] In accordance with embodiments, an unwanted emptying of the first buffer container section 13, and therefore a residue of the first secondary flow 12, when switching from the first main mode C1P to the first OFF mode C1OFF, can be (at least temporarily) prevented or reduced by means of a backflow preventing device (not shown), for example:

- a siphon or conduit for emptying the buffer connected to the first buffer container section 13 and triggerable or operated by a drainage pump,
- a closing siphon (configured to accumulate a water plug) downstream of the first buffer container section 13 and upstream of the first main use 16 or a closing plug, triggerable/activatable/deactivatable hydraulically and/or by means of a float and/or by the control system 15.

[0017] According to an embodiment, the first main conduit 8 forms a first main air gap 22 downstream of the first buffer container section 13 and upstream of the first main use 16. The first main air gap 22 prevents the formation of a depression in the first main conduit 8 and allows the establishment of the backflow from the first buffer container section 13 through the first branching section 11 into the first secondary conduit 10.

[0018] According to an embodiment, the first secondary conduit 10 forms a first secondary air gap 23 upstream of the first secondary use 17. The first secondary air gap 23 prevents the generation of a depression in the first secondary conduit 10.

Description of the path and positioning of the first main conduit 8 and of the first secondary conduit 10

[0019] According to an embodiment (Figure 7), in an installation position of the system 1, the first main conduit 8 continuously extends from below upwards, for example with an ascent angle 24 with respect to a horizontal direction in the range from 0° to 60°, preferably from 0° to 45°, (in the direction of the first main flow 9) until downstream of the first buffer container section 13, preferably up to the first main air gap 22 or up to the first main use 16. This ensures a gravitational backflow during the operation in the first secondary mode C1.1S.

[0020] According to an embodiment (Figure 7), the first branching section 11, the inlet segment 18, and the outlet segment 19 of the first main conduit 8 are aligned and form a straight conduit segment 25 oriented from below upwards (in the direction of the first main flow 9), preferably with an ascent angle 24 in the range from 15° to 60°, preferably from 15° to 45°.

[0021] According to an embodiment (Figures 3 to 5) in an installation position of the system 1, the first secondary conduit 10 continuously extends from above downwards, for example with a descent angle 27 with respect to a horizontal direction in the range from 0° to 90°, preferably from 0° to 45°, (in the direction of the first secondary flow 12), preferably up to the first secondary air gap 23 or up to the first secondary use 17. This ensures a gravitational first secondary flow 9 during the operation in the first secondary mode C1.1S.

[0022] According to an embodiment (Figure 7), the first secondary conduit 10 comprises an initial segment 26 directly branching from the first branching section 11 and oriented from above downwards, with a descent angle 27 with respect to a vertical direction in the range from 0° to 15°.

[0023] According to an embodiment, the straight conduit segment 25 and the initial segment 26 extend in a common vertical plane.

[0024] According to an embodiment (Figure 7), in the installation position of the system 1, the first valve inlet 4 and the first valve outlet 6 have a substantially horizontal orientation.

Description of the conduction body 28

[0025] According to an embodiment, the first branching section 11 and the first buffer container section 13 are formed in a conduction body 28, for example made of an injection-molded plastic material, for example closable or closed above by means of a covering wall 29, and forming a tubular main inlet connector 30, a tubular main outlet connector 31 and a tubular secondary outlet connector 32, preferably in a single piece (Figures 5, 7). This ensures that the relative orientations between the various flow paths and the dimensional consistency of the first buffer container section 13, facilitates the installation of the system 1 and reduces production costs.

[0026] The conduction body 28 has a box-like shape and the first buffer container section 13 also has a box-like shape, delimited by a bottom wall 33, an opposite upper covering wall 29, and a side wall 34.

[0027] According to an embodiment, the conduction body 28 forms, seen from the outside, at least a first cavity 35 intended to partially accommodate a protuberance of a detergent basin of a washing machine or washer-dryer, and/or at least a second cavity 36 intended to at least partially accommodate a protuberance of a ballast mass of a washing machine or washer-dryer, and/or at least one tube passage cavity 37 which keeps a passage space free for at least one further conduit of the system 1. This allows minimizing the space occupied by the system 1 inside the household appliance 2 and maximizing the useful volume of the first buffer container section 13.

First multi-way supply valve

[0028] According to an embodiment (**Figures 5 - 8**), the first supply valve 3 is a multi-way valve with said at least a first valve outlet 6 and:

- with at least one or more further first valve outlets 6.1, wherein the first supply electric valve 3 is controllable to selectively supply water to said one or more further first valve outlets 6.1.

[0029] Similarly or identically to the above description made with reference to the first conduit system 7 and the first multiple conduction assembly 42, the system 1 may comprise:

B.1) at least one or more further first conduit systems 7.1, configured according to the embodiments described with reference to the first conduit system 7, and not repeated herein for brevity, wherein the further first conduit system 7.1 together with the first supply electric valve 3 forms a further first multiple conduction assembly 42.1.

[0030] Said at least one or more further first conduit systems 7.1 comprise:

- a (further) first main conduit 8.1 connected to the further first valve outlet 6.1 to receive and conduct a (further) first main flow 9.1,
- a (further) first secondary conduit 10.1 branching from the (further) first main conduit 8.1, transversely and/or in the opposite direction with respect to the direction of the (further) first main flow 9.1, in a (further) first branching section 11.1 downstream of the further first valve outlet 6.1, to receive and conduct a (further) first secondary flow 12.1,
- a (further) first buffer container section 13.1 formed in the (further) first main conduit 8.1 downstream of the (further) first branching section 11.1 in a (further) buffer position 14 higher than the (further) first secondary conduit 10.1.

[0031] The further first conduit system 7.1 together with the first supply electric valve 3 constitutes a further first multiple conduction assembly 42.1.

[0032] The electronic control system 15 is configured to switch the first supply valve 3, i.e., the further first multiple conduction assembly 42.1:

C1.1OFF) to a (further) first OFF mode without supply of the further first valve outlet 6.1,

C1.1P) in a (further) first main mode, wherein it continuously supplies the further first valve outlet 6.1 to supply a (further) first main use 16.1 downstream of the (further) first buffer container section 13.1, wherein the transverse branching orientation of the (further) first secondary conduit 10.1 from the (further) first main conduit 8.1 and/or the branching orientation of the (further) first secondary conduit 10.1 in the opposite direction with respect to the direction of the (further) first main flow 9.1 limits a branching of a partial flow from the (further) first main flow 9.1 into the (further) first secondary conduit 10.1,

C1.1S) to a (further) first secondary mode, in which it intermittently supplies the further first valve outlet 6.1 with:

- one or more flow intervals, until at least partially filling the (further) first buffer container section 13.1, without the (further) first main flow 9.1 reaching said (further) first main use 16.1, alternating with
- one or more interruption intervals without supply of the further first valve outlet 6.1, wherein, due to the effect of gravity, a backflow is established from the (further) first buffer container section 13.1 through the (further) first branching section 11.1 into the (further) first secondary conduit 10.1 to supply the (further) first secondary flow 12.1 towards a (further) first secondary use 17.1 downstream of the (further) first secondary conduit 10.1.

[0033] According to an embodiment (**Figures 5 - 8**), the first supply valve 3 is a multi-way valve with said at least a first valve outlet 6, possibly one or more further first valve outlets 6.1, and:

- with at least one or more second valve outlets 38, wherein the first supply electric valve 3 is controllable to selectively supply water to said one or more second valve outlets 38. The one or more second valve outlets 38 may be connected by means of one or more respective second conduits 39 to one or more respective second uses 40, possibly with the interposition of one or more respective second air gaps 41.

Plurality of first supply valves

[0034] According to an embodiment (**Figure 8**), the system 1 may comprise:

- a plurality of said first one-way or multi-way supply valves 3, each selectively controllable by the electronic control system 15, and
- a plurality of said first conduit systems 7 each connected to only one of the first supply valves 3, respectively, so as to form a plurality of said first multiple conduction assemblies 41,

wherein the electronic control system 15 is configured to selectively switch each of the first supply valves 3, i.e., each of the first multiple conduction assemblies 42 to the first OFF mode (C1OFF), the first main mode (C1P), and the first secondary mode (C1S), and

- optionally, one or more of said further first conduit systems 7.1 connected to respective further first valve outlets 6.1 of at least one of the first supply valves 3, so as to form a plurality of said further first multiple conduction assemblies 41.1, wherein the electronic control system 15 is configured to selectively switch each of the further first multiple conduction assemblies 42.1 to the further first OFF mode (C1.1OFF), to the further first main mode (C1.1P), and to the further first secondary mode (C1.1S).

Plurality of first and second supply valves

[0035] According to a still further embodiment (**Figure 8**), the system comprises one or more second one-way or multi-way supply electric valves 43, selectively controllable by the electronic control system 15 and connected/connectable by means of one or more respective second conduits 39 to one or more respective second uses 40, possibly with the interposition of one or more respective second air gaps 41.

Description of the household appliance 2

[0036] The invention also relates to a water-conducting household appliance 2, in particular a washing machine and/or washer-dryer, comprising the water conducting system 1 described above.

[0037] The washing machine and washer-dryer comprises a support and housing structure 43, inside which a tank 44 is housed, provided with a front or upper opening, closable by means of a door 45 hinged frontally or above with respect to the support and housing structure 43. A drum 46 for accommodating the laundry to be washed and/or dried is housed inside the tank in a rotatable manner, for example, about a horizontal or inclined rotation axis. The drum 46 also delimits a front opening placed at the opening of the tank 44 or a side opening positionable at the opening of the tank 44, so as to load

and unload the laundry.

[0038] The tank 44 is adapted to contain the washing liquid during the laundry washing steps and, in the case of the washer-dryer, it constitutes a portion of a drying circuit 47 during a laundry drying step.

[0039] In order to allow the tank 44 to be loaded with mains water and detergent substances and additives, the household appliance 2 comprises the water conducting system 1, connectable to the water mains 5. The water conducting system 1 is configured to selectively adjust the supply of a plurality of flow paths through respective compartments of a detergent basin 48 up to the tank 44. A drainage conduit 49 associated with a drainage pump 50 is provided at the bottom of the tank 44, which removes the washing liquid from the tank 44 and, together with the control system 15 of the water conducting system 1, controls the level of liquid inside the tank 44.

[0040] An electrical resistor 49 for heating the washing liquid contained in the tank 44 is provided, the electrical resistor being arranged inside the tank 44, in the gap between the wall of the tank 44 and the drum 46.

[0041] The drying circuit 47 of the washer-dryer comprises a fan assembly 50, a heat exchanger 51 (aimed at condensing humidity) and a heating assembly 52 (with electrical resistor or heat pump) communicating with each other by means of a drying conduit 53.

[0042] In the drying circuit 47 (closed circuit), the air flow caused by the fan assembly 50 is heated by the heating assembly 52 and is conveyed into the drum 46, wherein, passing through the wet laundry, it causes the evaporation of the water contained in the fabrics. In the heat exchanger 51, generally of the spray or sprinkler type, the humid air is cooled by a flow of cold water. Due to the cooling, the steam condenses and is collected and drained together with the cooling water. The dehumidified air is then sucked up again by the suction assembly 50 and recirculated.

[0043] Moreover, the washing machine and/or washer-dryer may also comprise a steam generator 54 for the laundry steam treatment, also supplied by the water conducting system 1.

[0044] According to an embodiment, the first main conduit 8, or the tubular main outlet connector 31 of the conduction body 28, is connected to the detergent basin 48 or to a multi-dosage or self-dosing detergent dispenser (which therefore forms the first main use 16), to supply the detergent basin 48 or the multi-dosage detergent dispenser with water for one or more or all of the washing and/or pre-washing and/or fabric softener steps (washing machine or washer-dryer), whereas the first secondary conduit 10, or the tubular secondary outlet connector 32 of the conduction body 28, is connected:

- to the condensation heat exchanger 51, (which therefore forms the first secondary use 17) to supply the heat exchanger 51 with cooling water (washing machine or washer-dryer), or

- to a water container of the steam generator 54 (which therefore forms the first secondary use 17), to supply the steam generator 54 with water to be evaporated during a laundry steam treatment step (washing machine or washer-dryer).

[0045] In addition or alternatively, the further first main conduit 8.1, or the respective tubular main outlet connector 31 of the conduction body 28, is connected to the detergent basin 48 or to a multi-dosage or self-dosing detergent dispenser (which therefore forms the further first main use 16.1), to supply the detergent basin 48 or the multi-dosage detergent dispenser with water for one or more or all of the washing and/or pre-washing and/or fabric softener steps (washing machine or washer-dryer), whereas the further first secondary conduit 10.1, or the relative tubular secondary outlet connector 32 of the conduction body 28, is connected:

- to the condensation heat exchanger 51, (which therefore forms the first secondary use 17) to supply the heat exchanger 51 with cooling water (washing machine or washer-dryer), or
- to a water container of the steam generator 54 (which therefore forms the further first secondary use 17.1), to supply the steam generator 54 with water to be evaporated during a laundry steam treatment step (washing machine or washer-dryer).

[0046] According to a still further embodiment, the first (or further first) main conduit 8 (or 8.1), or the tubular main outlet connector 31 of the conduction body 28, is connected to a washing inlet of the detergent basin 48 or of a multi-dosage or self-dosing detergent dispenser (which therefore forms the first or further first main use 16 or 16.1), to supply the detergent basin 48 or the multi-dosage detergent dispenser with water for a washing step (washing machine or washer-dryer), whereas the first (or further first) secondary conduit 10 (or 10.1), or the tubular secondary outlet connector 32 of the conduction body 28, is connected to a fabric softener inlet of the detergent basin 48 or of the multi-dosage or self-dosing detergent dispenser (which therefore forms the first or further first secondary use 17 or 17.1), to supply the detergent basin 48 or the multi-dosage detergent dispenser with water for a fabric softener step (washing machine or washer-dryer).

Reference numerals

[0047]

water conducting system 1
household appliance 2
first supply electric valve 3
first valve inlet 4
mains water system 5
first valve outlet 6

first conduit system 7
first main conduit 8
first main flow 9
first secondary conduit 10
first branching section 11
first secondary flow 12
first buffer container section 13
buffer position 14
electronic control system 15
first main use 16
first secondary use 17
inlet segment 18
outlet segment 19
angular misalignment 20
constriction 21
first main air gap 22
first secondary air gap 23
ascent angle 24
straight conduit segment 25
initial segment 26
descent angle 27
conduction body 28
covering wall 29
tubular main inlet connector 30
tubular main outlet connector 31
tubular secondary outlet connector 32
bottom wall 33
side wall 34
first cavity 35
second cavity 36
tube passage cavity 37
second valve outlet 38
second conduits 39
second uses 40
second air gaps 41
first multiple conduction assembly 42
second supply electric valves 43
tank 44
door 45
drum 46
drying circuit 47
detergent basin 48
electrical resistor 49
fan assembly 50
heat exchanger 51
heating assembly 52
drying conduit 53
steam generator 54
support and housing structure 55
further first valve outlets 6.1
further first conduit systems 7.1
further first main conduit 8.1
further first main flow 9.1
further first secondary conduit 10.1
further first branching section 11.1
further first secondary flow 12.1
further first buffer container section 13.1
further first main use 16.1

further first secondary use 17.1

further first multiple conduction assembly 42.1

Claims

1. A water-conducting system (1) for the controlled supply of a plurality of conduits, in particular in a water-conducting household appliance (2), comprising:

A) at least a first supply electric valve (3) having:

- a first valve inlet (4) connectable to a mains water system (5), and
- at least a first valve outlet (6),

wherein the first supply electric valve (3) is controllable to selectively supply water to said first valve outlet (6),

B) at least a first conduit system (7), comprising:

- a first main conduit (8) connected to the first valve outlet (6) to receive and conduct a first main flow (9),
- a first secondary conduit (10) branching from the first main conduit (8), transversely and/or in the opposite direction with respect to the direction of the first main flow (9), in a first branching section (11) downstream of the first valve outlet (6), to receive and conduct a first secondary flow (12),
- a first buffer container section (13) formed in the first main conduit (8) downstream of the first branching section (11) in a buffer position (14) higher than the first secondary conduit (10), wherein the first conduit system (7) together with the first supply electric valve (3) forms a first multiple conduction assembly (42),

C) an electronic control system (15) controlling the first supply valve (3) and configured to switch the first multiple conduction assembly (42):

C1OFF) to a first OFF mode without supply of the first valve outlet (6),

C1P) to a first main mode, in which it continuously supplies the first valve outlet (6) to supply a first main use (16) downstream of the first buffer container section (13),

C1.1S) to a first secondary mode, in which it intermittently supplies the first valve outlet (6) with:

- one or more flow intervals, until the first buffer container section (13) is partially filled, alternating with

- one or more interruption intervals without supply of the first valve outlet (6), wherein, due to the effect of gravity, a backflow is established from the first buffer container section (13) through the first branching section (11) into the first secondary conduit (10) to supply the first secondary flow (12) towards a first secondary use (17) downstream of the first secondary conduit (10).

2. A system (1) according to claim 1, wherein the first main conduit (8) forms an inlet segment (18) in the first branching section (11) and an outlet segment (19) from the first branching section (11), substantially aligned with each other or having an angular misalignment of less than 45°, or less than 15°, seen in the direction of the first main flow (9),

wherein, at the first branching section (11), the first secondary conduit (10) has an angular misalignment (20) greater than 90° with respect to the inlet segment (18), seen in the direction of the first main flow (9).

3. A system (1) according to claim 1 or 2, wherein the first main conduit (8) forms a constriction (21) at the first branching section (11) so that the first main flow (9), acting as a driving flow, generates a Venturi suction effect on the first secondary conduit (10).

4. A system (1) according to any one of the preceding claims, wherein:

- the first main conduit (8) forms a first main air gap (22) downstream of the first buffer container section (13) and upstream of the first main use (16) to which it is connectable, and/or
- the first secondary conduit (10) forms a first secondary air gap (23) upstream of the first secondary use (17) to which it is connectable.

5. A system (1) according to any one of the preceding claims, wherein in an installation position, the first main conduit (8) extends continuously from below upwards, while the first secondary conduit (10) extends continuously from above downwards.

6. A system (1) according to any one of the preceding claims, wherein the first branching section (11), the inlet segment (18), and the outlet segment (19) of the first main conduit (8) are aligned and form a straight conduit segment (25) oriented from below upwards, in the direction of the first main flow (9), or oriented with an ascent angle (24) in the range from 15° to 60°, or from 15° to 45°, with respect to a horizontal plane. wherein the first secondary conduit (10) comprises an initial segment (26) directly branching from the first branching section (11) and oriented from above

downwards, or oriented with a descent angle (27) in the range from 0° at 15°, or 0°, with respect to a vertical direction.

7. A system (1) according to claim 6, wherein the straight conduit segment (25) and the initial segment (26) extend in a common vertical plane. 5
8. A system (1) according to any one of the preceding claims, wherein the first branching section (11) and the first buffer container section (13) are formed in a conduction body (28) made of an injection-molded plastic material, and forming a tubular main inlet connector (30), a tubular main outlet connector (31), and a tubular secondary outlet connector (32) in a single piece. 10 15
9. A system (1) according to claim 8, wherein the conduction body (28) has a box-like shape and the first buffer container section (13) also has a box-like shape, delimited by a bottom wall (33), an opposite upper covering wall (29), and a side wall (34), wherein the conduction body (28) forms, seen from outside, at least: 20 25
 - a first cavity (35) intended to partially accommodate a protuberance of a detergent basin of a washing machine, and/or
 - at least a second cavity (36) intended to accommodate, at least partially, a protuberance of a ballast mass of a washing machine, and/or
 - at least one tube-passage cavity (37) delimiting a passage space for at least one further conduit of the system (1). 30 35
10. A system (1) according to any one of the preceding claims, wherein the first supply valve (3) is a multi-way valve and comprises at least one or more further first valve outlets (6.1), wherein: 40
 - the first supply electric valve (3) is controllable to selectively supply water to said one or more further first valve outlets (6.1),
 - the system (1) comprises at least one or more further first conduit systems (7.1) which, together with the first supply electric valve (3), form one or more further first multiple conduction assemblies (42.1),
 - the electronic control system (15) is configured to switch each of said further first multiple conduction assemblies (42.1) to a further first OFF mode, a further first main mode, and a further first secondary mode. 50
11. A system (1) according to any one of the preceding claims, wherein: 55
 - A) the first supply valve (3) is a multi-way valve

and comprises at least one or more second valve outlets (38), wherein:

- the first supply electric valve (3) is controllable to selectively supply water to said one or more second valve outlets (38), wherein one or more respective second conduits (39) are connected to the one or more second valve outlets (38) to supply water to one or more respective second uses (40) and/or

B) the system (1) comprises:

- a plurality of said first supply valves (3), each selectively controllable by the electronic control system (15), and
- a plurality of said first conduit systems (7) each connected to only one of the first supply valves (3), respectively, so as to form a plurality of said first multiple conduction assemblies (41), wherein the electronic control system (15) is configured to selectively switch each of the first multiple conduction assemblies (42) to the first OFF mode, the first main mode, and the first secondary mode and/or

C) the system (1) comprises:

- one or more second supply electric valves (43) selectively controllable by the electronic control system (15) and connected by means of one or more respective second conduits (39) to one or more respective second uses (40).

12. A water-conducting household appliance (2), in particular a washing machine or a washer-dryer, comprising the system (1) according to any one of the preceding claims. 40

13. A household appliance (2) according to claim 12, wherein: 45

- the first main conduit (8) is connected to a detergent basin or dispenser (48) of the household appliance (2), which forms the first main use (16), and supplies water to said detergent basin or dispenser (48) in the first main mode for a laundry washing step and/or pre-washing step and/or fabric softener step,
- the first secondary conduit (10) is connected to a condensing heat exchanger (51) of the household appliance (2), which forms the first secondary use (17), and supplies cooling water to said

heat exchanger (51) in the first secondary mode.

14. A household appliance (2) according to claim 12, wherein:

- the first main conduit (8) is connected to a detergent basin or dispenser (48) of the household appliance (2), which forms the first main use (16), and supplies water to said detergent basin or dispenser (48) in the first main mode for a laundry washing step and/or pre-washing step and/or fabric softener step, 5 10

- the first secondary conduit (10) is connected to a water container of a steam generator (54) of the household appliance (2), which forms the first secondary use (17), and supplies said water container of the steam generator (54) in the first secondary mode for a laundry steam treatment step. 15

15. A household appliance (2) according to claim 12, wherein: 20

- the first main conduit (8) is connected to a washing inlet of a detergent basin or dispenser (48) of the household appliance (2), which forms the first main use (16), and supplies said detergent basin or dispenser (48) in the first main mode with water for a laundry washing step, 25

- the first secondary conduit (10) is connected to a fabric softener inlet of a detergent basin or dispenser (48) of the household appliance (2), which forms the first secondary use (17), and supplies said fabric softener inlet in the first secondary mode with water for a laundry fabric softener step. 30 35

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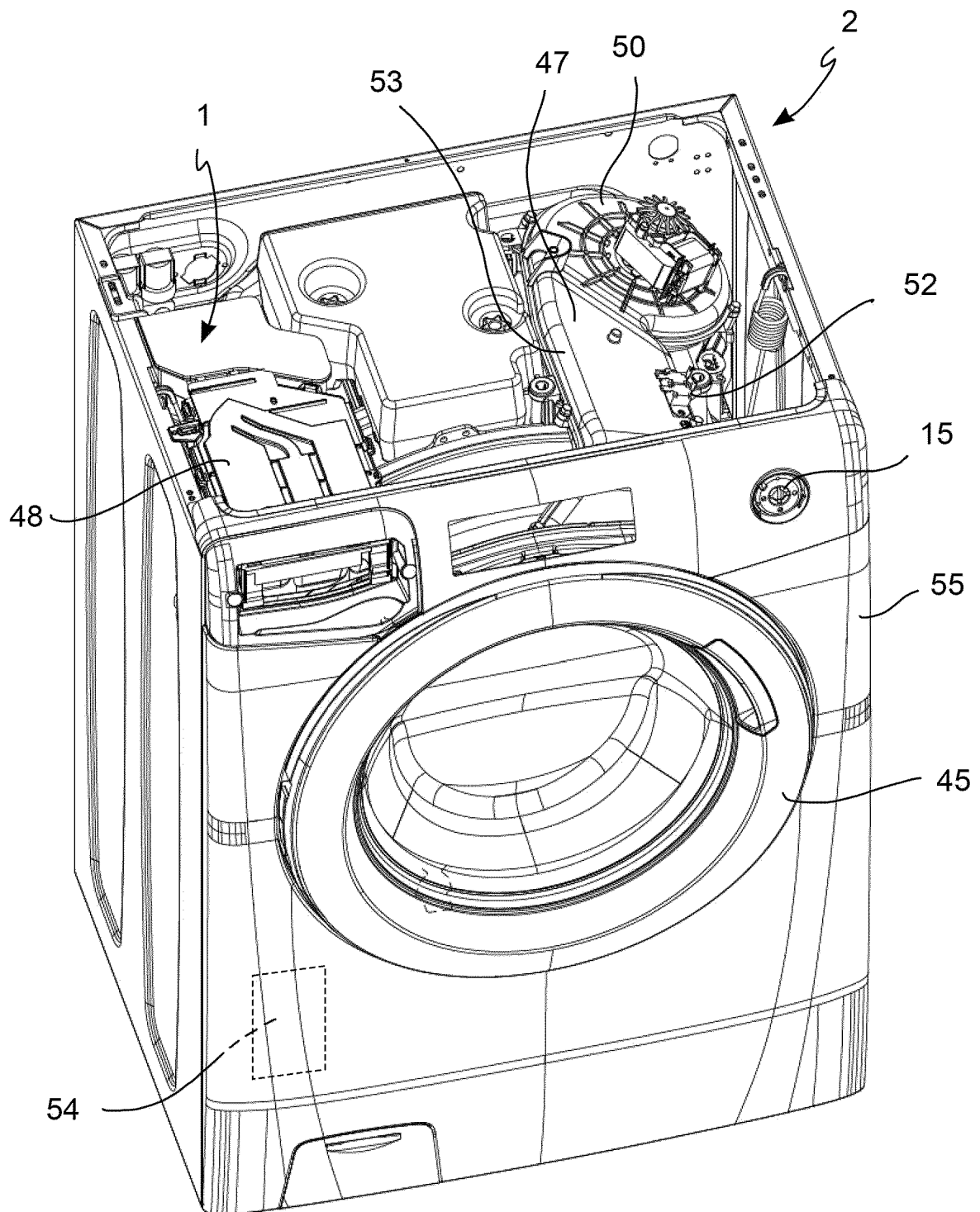


FIG. 1

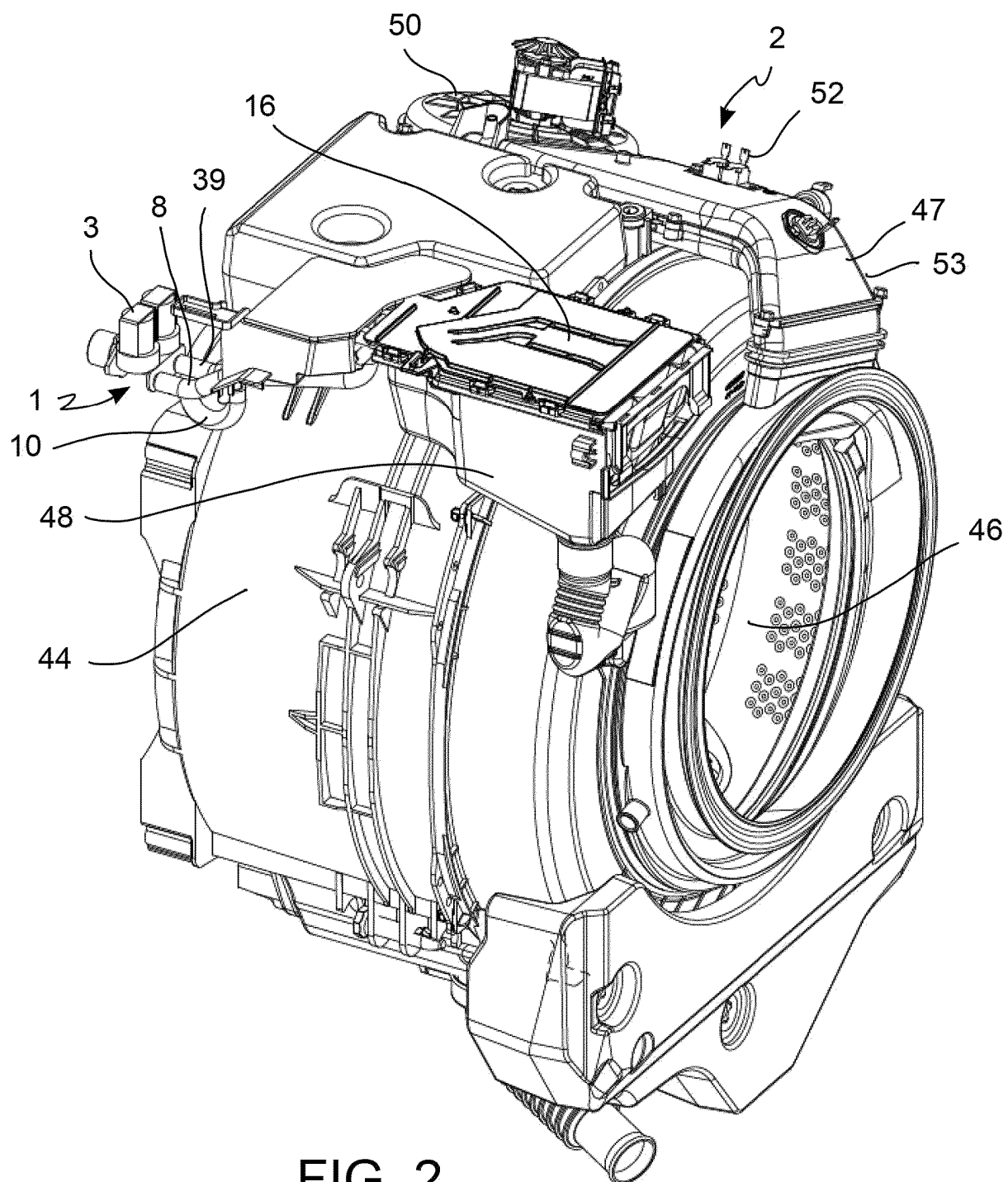


FIG. 2

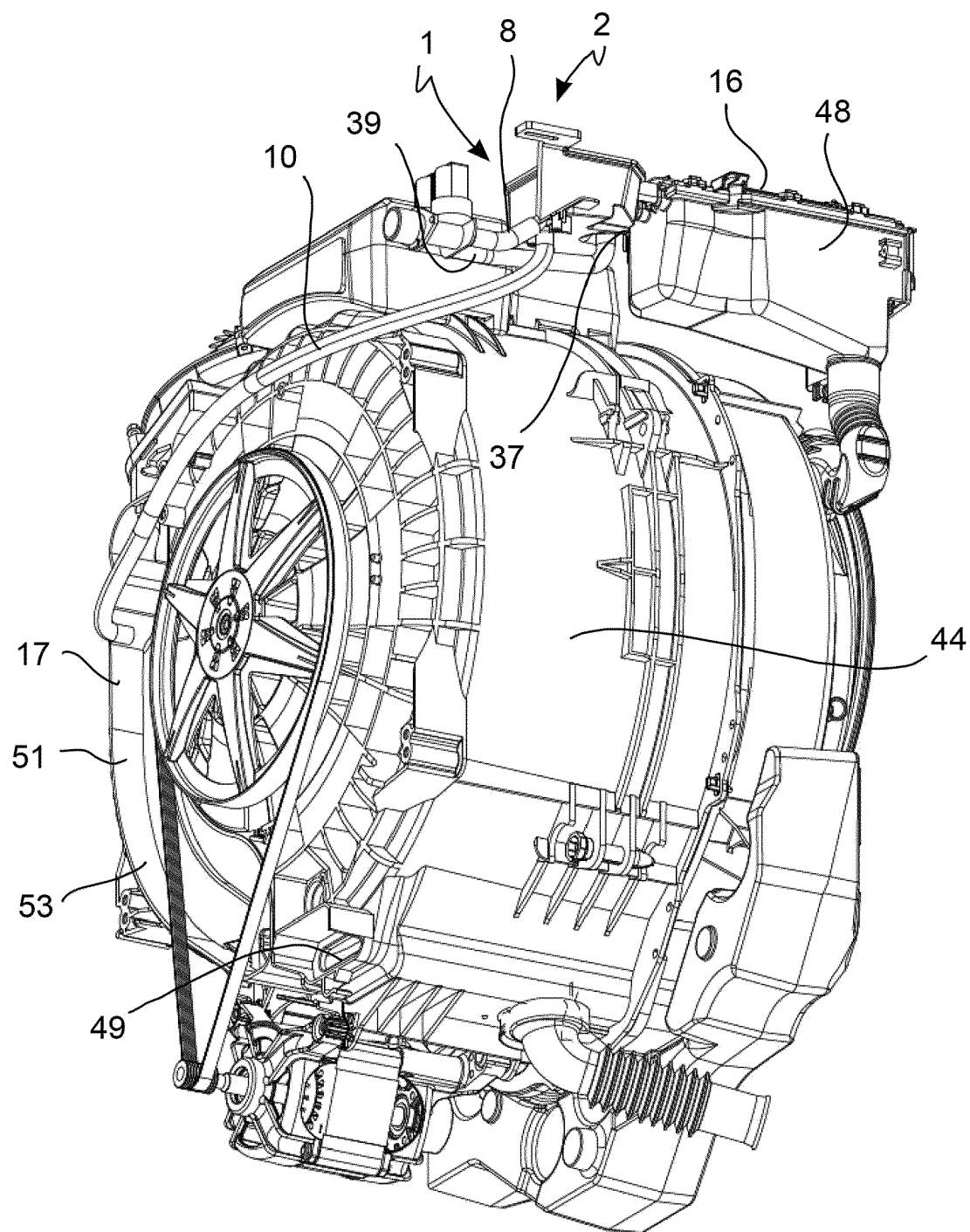


FIG. 3

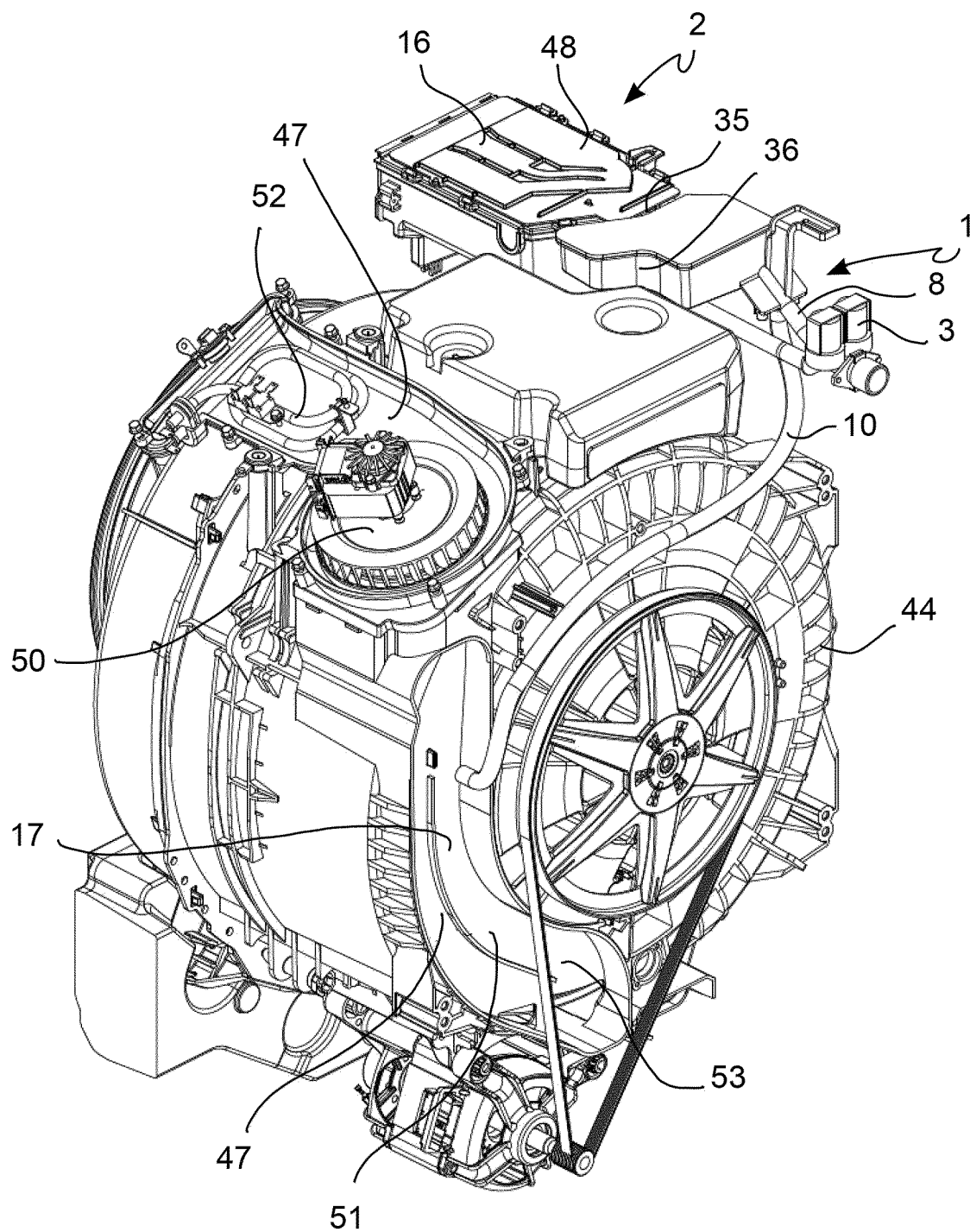
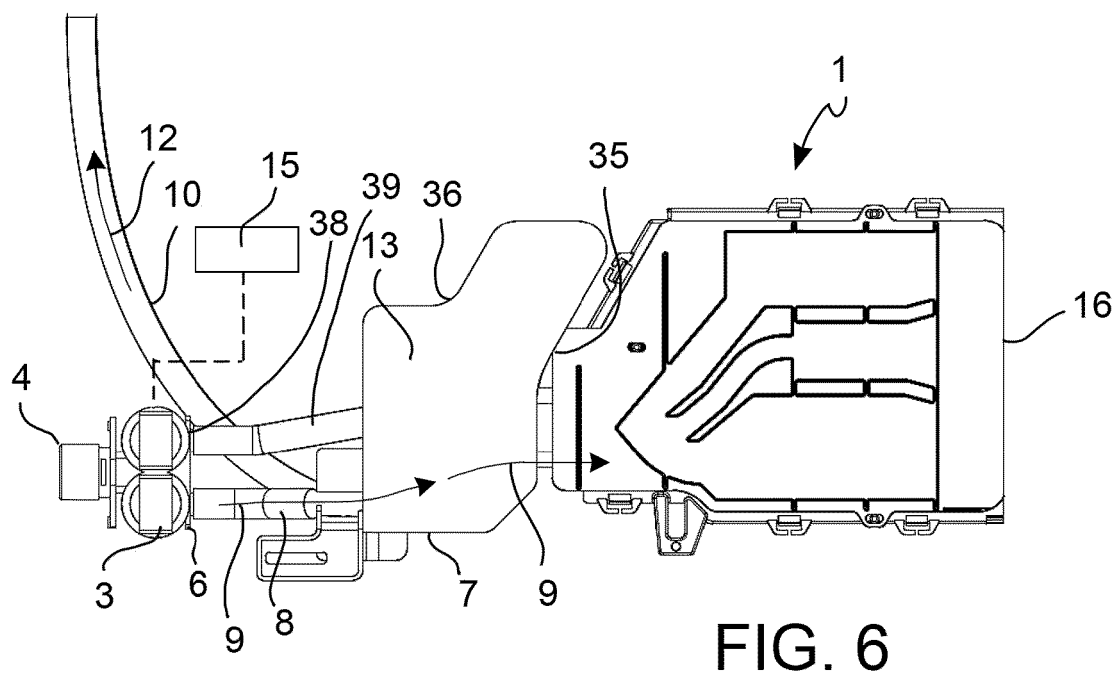
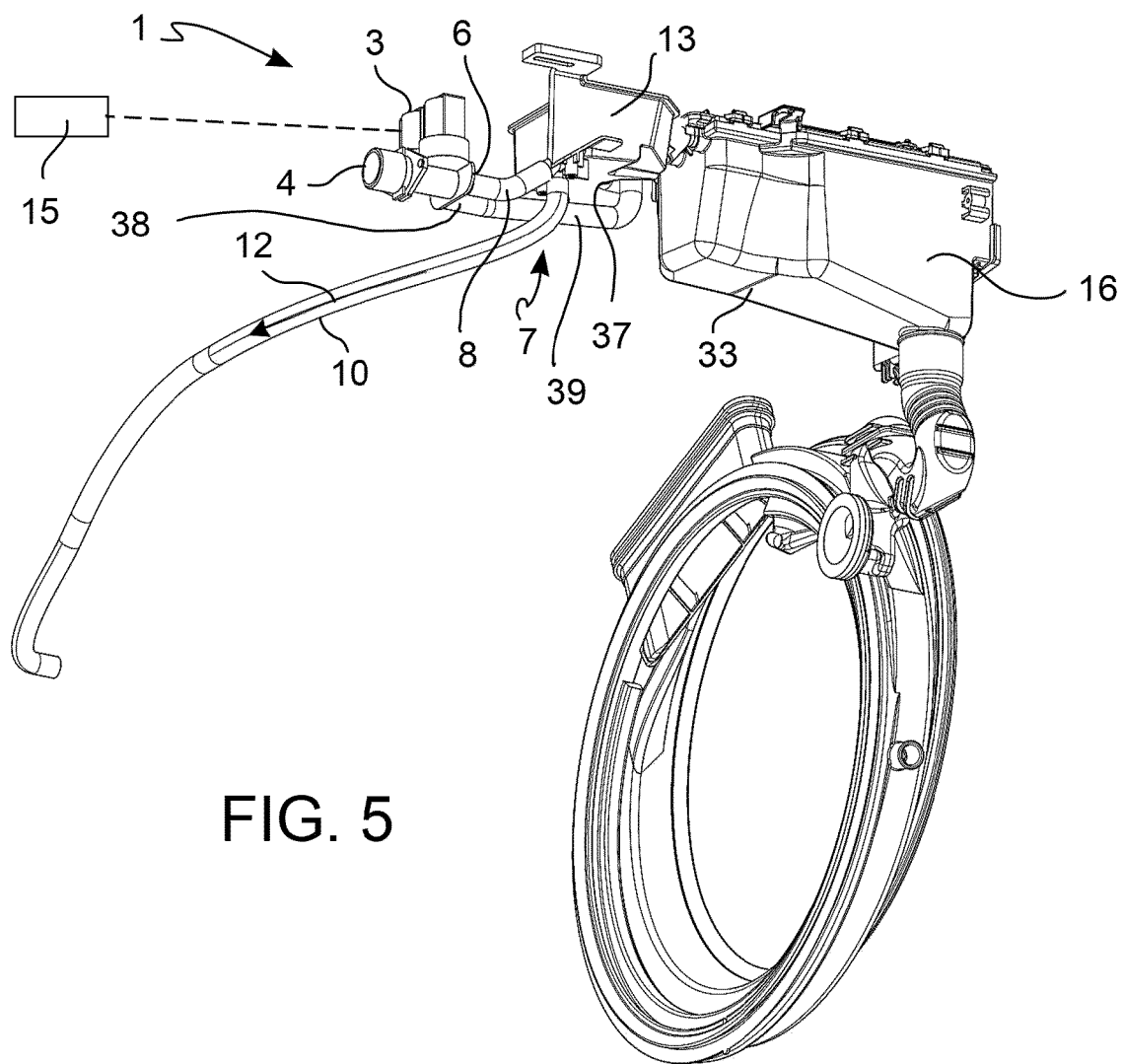
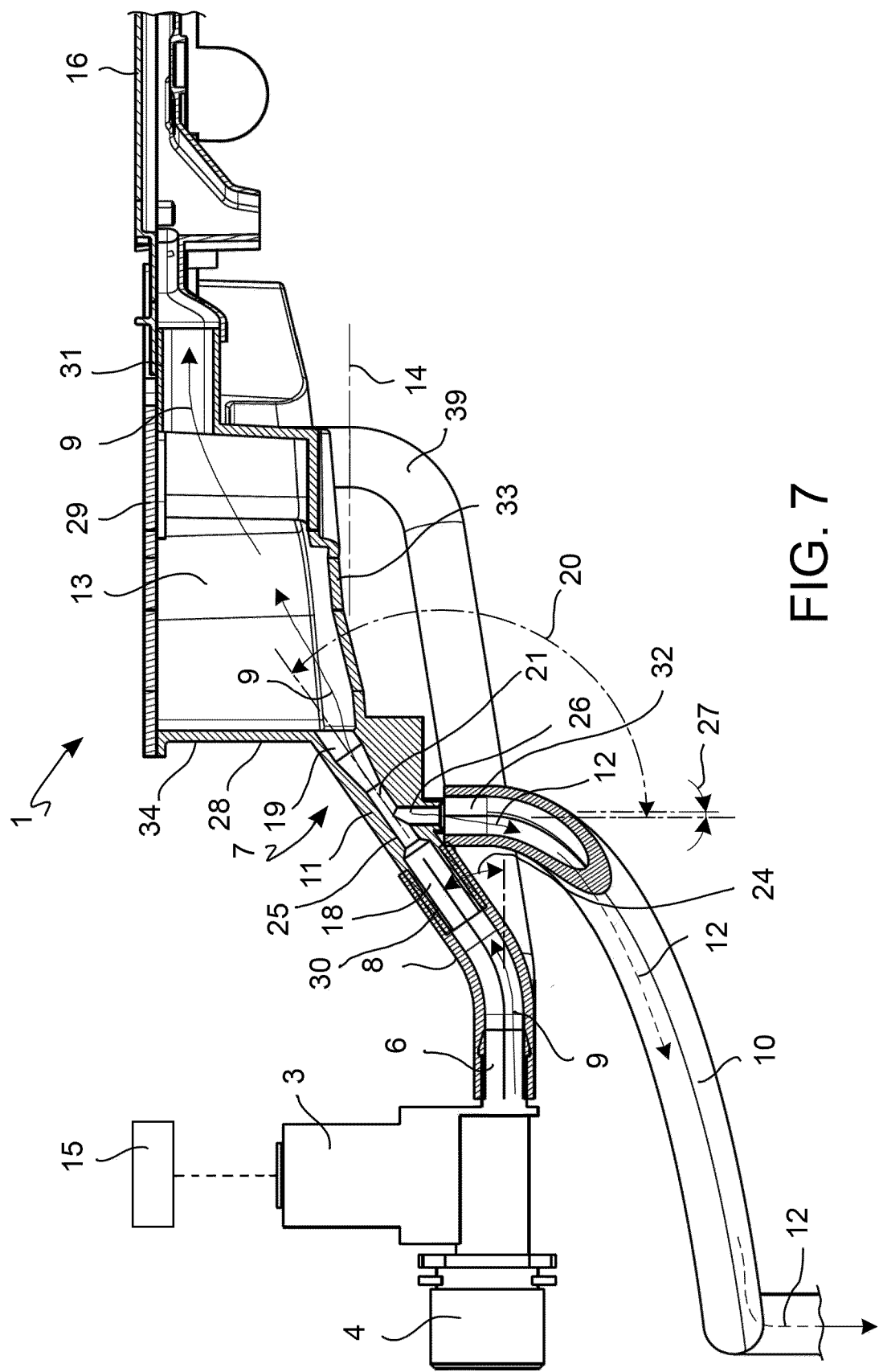


FIG. 4





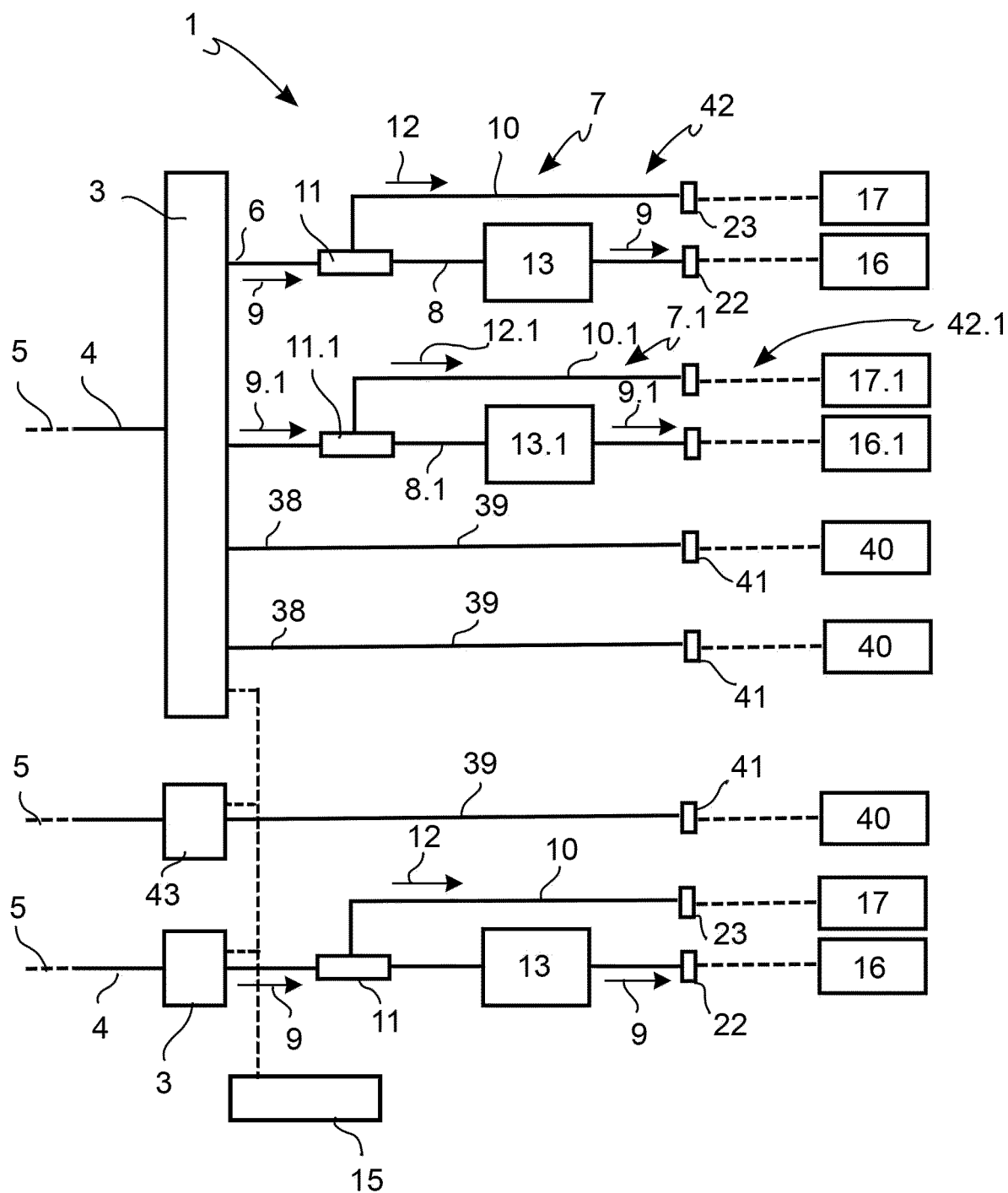


FIG. 8



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Application Number

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Place of search		Date of completion of the search	Examiner
Munich		13 February 2025	Weidner, Maximilian
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