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(54) **WASHING MACHINE**

(57) It is provided a washing machine (1) comprising a loading conduit (2) capable of being placed in fluid passage connection with an external water network, a discharge conduit (3) capable of being placed in fluid passage connection with an external water network, a hydraulic circuit (4) in fluid passage connection with the conduits (2, 3) between the conduits (2, 3) and comprising a tank (40) configured to accumulate or discharge a predetermined volume of washing liquid, a centrifugal basket (41) housed in the basin (40) and capable of containing a plurality of wash cloths, a first filter (42) arranged downstream of the basin (40) and configured to filter the washing liquid, a pump (43) arranged downstream of the first filter (42) and configured to convey the washing liquid at least towards the discharge duct (3), a recycling conduit (5) in fluid passage connection with the pump (43) and the basin (40) between the pump (43) and the basin (40), and a second filter (6) configured to sanitise the washing liquid, wherein the circuit (4) further comprises a tank (44) arranged between the first filter (42) and the pump (43) and configured to accommodate at least the predetermined volume of washing liquid, and a selector valve (45) arranged upstream of the recycling conduit (5) and the discharge conduit (3) and configured to selectively place in fluid passage connection the circuit (4) and the recycling conduit (5) or the circuit (4) and the discharge conduit (3), and wherein the second filter (6) is arranged downstream of the tank (44).

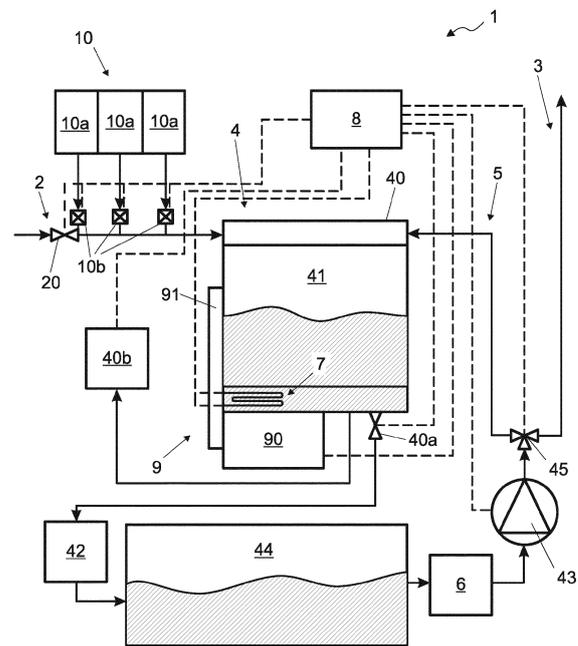


Fig. 1

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Description

[0001] The present invention relates to a washing machine of the type specified in the preamble to the first claim.

[0002] More particularly, the present invention has as its object a washing machine for domestic use, configurable for front or top loading, or for industrial or other use, and suitable for washing clothes or, more generally, soiled fabrics.

[0003] As is well known, a washing machine is a domestic appliance used for the automatic washing of clothes. Normally, water in combination with detergents is used to carry out the washing cycle.

[0004] However, there are also washing machines that perform dry cleaning using organic solvents, usually used in specialised establishments.

[0005] As is well known, the household washing machines are basically configured in two ways, namely front-loading and top-loading.

[0006] The front-loading washing machines comprise a door at the front of the machine, the so-called porthole, whereas the top-loading washing machines comprise a door at the top of the machine.

[0007] In any case, any washing machine comprises a plurality of components that determine its operation.

[0008] First, a domestic washing machine comprises at least a door, a movable basket which can be accessed through the door, and a hydraulic circuit, i.e. a circuit for the passage of a liquid, typically water with or without detergent, from a loading conduit to a discharge conduit and passing through a tank housing the basket.

[0009] Naturally, the washing machine also includes means of moving the basket, typically to rotate it around its own axis within the basin.

[0010] In addition, the washing machine includes a detergent drawer, inside which various types of detergent can be introduced, in fluid passage connection with the loading conduit or directly with the basin, a water level sensor in the basin, a heating element for heating the water in the basin, a discharge pump and a motor for driving the basket. In conclusion, each washing machine includes a control panel, or washing programme selector, capable of coordinating the operation of the various components to carry out different types of washing.

[0011] The known technique described includes some important drawbacks.

[0012] In particular, during the normal washing cycles, the washing machine draws water from an external water network, conveys it into the basin together with the detergents, and expels it from the basin through the pump, passing through the filter, causing it to flow out of the drain.

[0013] This passage occurs several times during the washing process. Consequently, ordinary washing machines consume a considerable amount of water, which basically passes from the loading conduit to the discharge conduit in each cycle.

[0014] In addition, since the hydraulic circuit is operated by an electrical system, ordinary washing machines consume a significant amount of electricity during all cycles.

5 **[0015]** In conclusion, the water that is fed, at each cycle, into the circuit must be heated each time and therefore the hot water unnecessarily disperses the heat accumulated during its own outflow into the external water network that receives the liquid from the drain pipe.

10 **[0016]** In this situation, the technical task underlying the present invention is to devise a washing machine capable of substantially obviating at least part of the aforementioned drawbacks.

[0017] In the context of said technical task, it is an important scope of the invention to obtain a washing machine capable of substantially reducing water consumption, i.e. the total flow rate of water input from the external water supply to ensure normal washing of clothes.

20 **[0018]** Another important scope of the invention is to achieve a washing machine which allows to reduce the electrical consumption, in particular during the management of washing cycles.

[0019] In conclusion, a further technical task of the invention is to avoid that the energy spent during the washing cycles, for example to heat the water, is dispersed outside the washing machine.

[0020] The specified technical task and purposes are achieved by a washing machine as claimed in the appended claim 1.

30 **[0021]** Preferred technical solutions are disclosed in the dependent claims.

[0022] The features and advantages of the invention are hereinafter clarified by the detailed description of preferred embodiments of the invention, with reference to the appended drawings, in which:

the **Fig. 1** illustrates a first functional diagram of a washing machine according to the invention;

the **Fig. 2** illustrates a second functional scheme of a washing machine according to the invention;

the **Fig. 3** is a third functional diagram of a washing machine according to the invention;

the **Fig. 4** depicts a fourth functional diagram of a washing machine according to the invention; and

the **Fig. 5** shows a simplified embodiment example of a washing machine according to the invention.

[0023] In the present document, the measurements, values, shapes and geometric references (such as perpendicularity and parallelism), when associated with words like "about" or other similar terms such as "approximately" or "substantially", are to be considered as except for measurement errors or inaccuracies due to production and/or manufacturing errors, and, above all, except for a slight divergence from the value, measurements, shape, or geometric reference with which it is associated. For instance, these terms, if associated with a value, preferably indicate a divergence of not more than 10% of the

value.

[0024] Moreover, when used, terms such as "first", "second", "higher", "lower", "main" and "secondary" do not necessarily identify an order, a priority of relationship or a relative position, but can simply be used to clearly distinguish between their different components.

[0025] Unless otherwise specified, as results in the following discussions, terms such as "treatment", "computing", "determination", "calculation", or similar, refer to the action and/or processes of a computer or similar electronic calculation device that manipulates and/or transforms data represented as physical, such as electronic quantities of registers of a computer system and/or memories in, other data similarly represented as physical quantities within computer systems, registers or other storage, transmission or information displaying devices.

[0026] The measurements and data reported in this text are to be considered, unless otherwise indicated, as performed in the International Standard Atmosphere ICAO (ISO 2533:1975).

[0027] With reference to the Figures, the washing machine according to the invention is globally referred to as 1.

[0028] The washing machine 1 is a household appliance for washing, or even just rinsing, soiled clothes.

[0029] Accordingly, the washing machine 1 is configured to be connected to an external water supply so as to be able to receive from it or transfer to it water used for washing. Preferably, the washing machine is of a domestic type, but it could also be industrial and be used for different types of washing.

[0030] Therefore, preferably, the washing machine 1 comprises at least one loading conduit 2.

[0031] The loading conduit 2 is intended to be placed in fluid passage connection with the external water network. Substantially, therefore, the loading conduit 2 may be a tubular element that can be constrained to the common wall connections present in dwellings. In general, the loading conduit 2 is configured to convey incoming water to the washing machine 1.

[0032] Thus, the loading conduit 2 may comprise a first valve 20.

[0033] If present, the first valve 20 is configured to allow or obstruct the passage of water into the loading conduit 2. Thus, for example, the first valve 20 may comprise a one-way valve, for example a solenoid valve.

[0034] The washing machine 1 further comprises at least one discharge conduit 3. As the loading conduit 2, the discharge conduit 3 is capable of being placed in fluid passage connection with the external water supply. The discharge conduit 3 may therefore also be a tubular element that can be constrained to the common wall connections present in dwellings.

[0035] In general, the discharge conduit 3 is configured to convey a washing liquid, water-based, outflow from the washing machine 1.

[0036] Naturally, the washing machine 1 also comprises a circuit 4.

[0037] The circuit 4 is essentially a set of ducts, pipes or fittings configured to convey water along at least one path. Therefore, preferably, the circuit 4 is hydraulic.

[0038] Furthermore, the circuit 4 is in fluid passage connection with the conduits 2, 3. In particular, the circuit 4 connects the ducts 2, 3 and is therefore substantially arranged between the ducts 2, 3.

[0039] The circuit 4 allows water to flow to the different areas of the washing machine in order to wash the clothes laid therein. Naturally, the water can flow on its own, or it can be admixed with detergent substances, i.e. cleaning agents, disinfectants or others. Preferably, the circuit 4 distributes and conveys the washing liquid.

[0040] The washing liquid may comprise or consist of water. Thus, the washing liquid may be understood as water, whether admixed or not, which is originally clean and then becomes dirty, during washing, carrying with it the dirt particles taken from the clothes. Therefore, when we speak of washing liquid, we mean a liquid that is mainly water-based and can therefore include or consist of the same water with or without additives, clean or dirty.

[0041] The washing machine 1 may, in fact, include a drawer 10.

[0042] The drawer 10 is essentially a removable element that can be accessed from outside the washing machine 1.

[0043] Thus, the drawer 10 preferably includes one or more housings 10a. The latter are substantially trays within which at least one liquid or granular substance may be placed. Each housing 10a is substantially configured to accommodate at least one detergent. The latter may be fed into the housing 10a to be subsequently conveyed to the circuit 4.

[0044] Thus, preferably, each of the housings 10a is in fluid passage connection with the circuit 4. In addition, the housings 10a are in fluid passage connection with the circuit 4 in the vicinity of the loading conduit 2, possibly directly downstream or right on the loading conduit 2.

[0045] In order to be able to control the conveyance of the detergent to the water, preferably each housing 10a can be connected to the circuit 4 via a second valve 10b.

[0046] If present, the second valve 10b is configured to allow or obstruct the outflow of detergent from the housing 10a. Therefore, the second valve 10b may also be a one-way valve, for example a solenoid valve.

[0047] Thus, the circuit 4 comprises a plurality of components.

[0048] Preferably, the circuit 4 comprises at least one basin 40.

[0049] The basin 40 is substantially a chamber that can be accessed from the outside, for example via a door.

[0050] The basin 40 is thus configured to accumulate or discharge washing liquid. In detail, preferably, the basin 40 receives water from the loading conduit 2 and is then suitable for filling and/or discharging the washing liquid to the discharge conduit 3.

[0051] To control the accumulation or discharge of the washing liquid, the basin 40 may comprise a third valve

40a.

[0052] The third valve 40a is configured to allow or obstruct the outflow of wash liquid from the basin 40. Thus, the third valve 40a may also simply include a one-way valve, for example a solenoid valve.

[0053] In further detail, the basin 40 accumulates or discharges a predetermined volume of washing liquid. The predetermined volume of washing liquid may be defined, for example, by the total volume of the basin 40. Or, more appropriately, the predetermined volume of wash liquid stored or accumulated in the basin 40 may be equal to a volume of wash liquid provided by the wash program.

[0054] To determine the predetermined volume, preferably the circuit 4 also comprises a pressure switch **40b**.

[0055] If present, the pressure switch 41b is in fluid passage connection with the basin 40. Furthermore, the pressure switch 41b is configured to detect the pressure of the washing liquid in the basin 40 preferably at the bottom of the latter.

[0056] Thus, as further described below, the washing machine 1 can be configured to drive the third valve 40a in relation to the values detected by the pressure switch 40b.

[0057] As in ordinary washing machines, preferably the third valve 40b is opened when the pressure of the washing liquid reaches a predetermined pressure value.

[0058] A predetermined volume of washing liquid is also associated with the predetermined pressure value in relation to the cross-sectional area of the basin 40. Thus, the latter predetermined volume is the maximum volume of washing liquid that can be accumulated in the basin 40.

[0059] The circuit 4 also comprises further components.

[0060] The circuit 4 also comprises a basket **41**.

[0061] The basket 41 is substantially centrifugal. Thus, the basket 41 is preferably configured to rotate about its own central axis.

[0062] Furthermore, the basket 41 is housed in the tub 40. Thus, the basket 41 is suitable for holding a plurality of cloths, typically the soiled cloths to be washed. Obviously, therefore, the basket 41 is an element preferably at least partially perforated so as to allow the washing liquid, comprising additive or non-additive water, present in the tub 40 to penetrate the basket 41 to invest the cloths.

[0063] The circuit 4 further comprises a first filter **42**.

[0064] The first filter 42 is preferably arranged downstream of the basin 40. Thus, the first filter 42 is configured to filter the washing liquid.

[0065] The first filter 42 is substantially of the type found in ordinary washing machines. Thus, it substantially comprises a removable mesh element, accessible via a flap that can be opened from outside the washing machine 1.

[0066] The circuit 4 also comprises a pump **43**.

[0067] The pump 43 is arranged downstream of the first filter 42. Thus, the pump 43 is preferably configured to convey the washing liquid at least towards the dis-

charge conduit 3.

[0068] Then, once the basin 40 has been drained, the washing liquid flows towards the first filter 42 and is pumped by the pump 43 towards the discharge conduit 3 to be removed from the washing machine 1.

[0069] Naturally, the washing machine 1 may include additional elements.

[0070] For example, the washing machine 1 may include heating means **7**.

[0071] The heating means 7 are preferably housed in the tub 40. In any case, the heating means 7 are configured to heat the predetermined volume of washing liquid in the tub 40. Thus, the heating means 7 are the means for increasing the temperature of the washing liquid to enable more or less invasive washing of the clothes.

[0072] In a simple embodiment, the heating means 7 may correspond to an electrical resistance arranged in the basin 40 in contact with the washing liquid accumulated therein.

[0073] To enable control of the washing machine 1, the latter may comprise control means **8**. The control means 8 are preferably electrical means. Furthermore, they are preferably accessible from outside the washing machine 1. For example, they may comprise a control panel or button panel, which in common washing machines is also referred to as a programme selector.

[0074] Thus, the control means 8 may be operatively connected to a plurality of components. For example, the control means 8 may be operatively connected to the first valve 20 and/or the second valve 10b and/or the third valve 40a.

[0075] Furthermore, the control means 8 could also be operatively connected to the heating means 7 to control the temperature increase to be imposed on the washing liquid.

[0076] Furthermore, the control means 8 are preferably connected to the pump 43. In this way, the control means 8 may not only control the washing program with the loading of washing liquid via the valves 20, 10b, but may also control the draining of the liquid via the third valve 40a and the pump 43 which conveys the washing liquid to the drain line 3.

[0077] Naturally, the control means 8 can manage and coordinate all the operations of the washing machine 1 during the washing cycles independently or automatically.

[0078] In addition, the control means 8 preferably also manage the movement of the basket 41.

[0079] In this respect, preferably, the washing machine 1 also comprises handling means 9. The handling means 9 are substantially configured to move the basket 41 in the basin 40. Thus, the handling means 9 are preferably mechanically connected to the basket 41.

[0080] The handling means 9 comprise, in more detail, at least one motor **90** and transmission means **91**.

[0081] The motor 90 is preferably a rotary motor. Furthermore, it is operatively connected to the drive means 8 so that the latter can control its operation according to

the selected washing programme.

[0082] The transmission means 91 are, on the other hand, configured to transmit the motion of the motor 90 to the basket 41. Thus, they may comprise, in the most trivial form, a shaft connecting motor 90 and basket 41, or a pair of pulleys connected to motor 90 and basket 41 and reciprocally connected by a belt, or even gears.

[0083] The features described above are mostly common in most washing machines currently on the market.

[0084] However, the washing machine 1 otherwise also includes a recycling conduit 5. Advantageously, the recycling conduit 5 is preferably in fluid passage connection with the pump 43 and the basin 40. In particular, the recycling conduit 5 connects the pump 43 and the basin 40 and is therefore substantially arranged between them.

[0085] In general, the recycling conduit 5 is configured to convey flushing fluid from the pump 43 to the basin 40.

[0086] Thus, the recycle conduit 5 substantially makes a loop portion of the circuit through which the washing liquid dispensed from the basin 40 can return to the basin 40 itself after passing through the filter 32 and the pump 43.

[0087] Preferably, moreover, the washing machine 1 comprises a second filter 6.

[0088] The second filter 6 is substantially configured to sanitise the washing liquid. Thus, the second filter 6 is configured to clean the washing liquid flowing therein.

[0089] Furthermore, the second filter 6 may also be capable of disinfecting the washing liquid. The second filter 6 may be positioned upstream of the pump 43 or downstream thereof. Advantageously, the washing machine 1 may also comprise other components. Preferably, the circuit 4 also comprises a tank 44.

[0090] The tank 44 is arranged between the first filter 42 and the pump 43. Furthermore, the tank 44 is configured to accommodate at least the predetermined volume of washing liquid.

[0091] Thus, the tank 44 is essentially a closed casing within which all of the washing liquid used in the washing cycle and thus previously fed into the basin 40 can be conveyed. Advantageously, the tank 44 includes thermally insulated walls. In this way, the tank 44 allows the heat dispersion of the washing liquid contained therein to be reduced. This means that the washing machine 1 is able to store the washing liquid at temperature inside the tank 44.

[0092] The tank 44 may be operatively connected to a dispenser 44a.

[0093] If present, the dispenser 44a could be configured to feed detergents or disinfectants into the tank 44. Thus, the dispenser 44a could be operatively connected to the control means 8.

[0094] Or, or even additionally, the tank 44 could be in pass-through connection with one or more of the enclosures 10a, in particular also via a second valve 10b. Thus, the control means 8 could be configured to feed a detergent into a housing 10a within the tank 44 or even to split the detergent from a housing 10a partly into the basin 40

and partly into the tank 44.

[0095] Preferably and advantageously, the circuit 4 also comprises a selector valve 45.

[0096] The selector valve 45 is arranged upstream of the recycling conduit 5 and the discharge conduit 3.

[0097] Thus, the selector valve 45 is configured to selectively place in fluid passage connection the circuit 4 and the recycling conduit 5 or the circuit 4 and the discharge conduit 3. In other words, the selector valve 45 is substantially a washing fluid shunting valve. Thus, preferably, the control means 8 are also operatively connected to the selector valve 45 and can be configured as further detailed below.

[0098] In general, the second filter 6 is advantageously arranged downstream of the tank 44. More specifically, as already mentioned, it can be arranged upstream of the pump 43, i.e. between the tank 44 and the pump 43, or it can be included in the recycling conduit 5, i.e. downstream of the pump 43. The latter configuration is preferable as it reduces the consumption of the second filter 6 since the latter only acts on the washing liquid returning to the basin 40.

[0099] Furthermore, the second filter 6 can be, like the first filter 42, manipulated from outside the washing machine 1, i.e. easily accessible via a flap.

[0100] The operation of the washing machine 1 described above in structural terms is as follows.

[0101] Basically, when the washing programme is started, without dwelling on what is common to all washing machines, it is possible to avoid that the washing liquid is always conveyed to the discharge conduit 3.

[0102] Advantageously, in fact, by means of the selector valve 45, the control means 8 can be configured to keep the washing liquid circulating in the circuit throughout the washing. Thus, the washing liquid can be expelled from the discharge conduit 3 to allow only the final rinse.

[0103] The invention advantageously encompasses a new procedure for washing cloths. The procedure is naturally implemented by the washing machine 1.

[0104] In brief, the process comprises at least one conveying step in which the washing liquid is conveyed into the basin 40 until it reaches a predetermined volume and a step of moving the basket 41 into the basin 40.

[0105] These phases are substantially common to all washing machines.

[0106] However, the process advantageously also comprises an accumulation phase in which the washing liquid is drained from the basin 40 into the tank 44 through the first filter 42.

[0107] Furthermore, the procedure comprises a second conveying phase in which the washing liquid is conveyed, via the pump 43, into one of a choice between the recycling conduit 5 and the discharge conduit 3. One of them is naturally selected via the selector valve 45.

[0108] In conclusion, the process includes a sanitising phase.

[0109] In the sanitising phase, the washing liquid is sanitised via the second filter 6.

[0110] Depending on the position of the second filter 6, the sanitising step may be before or after the second conveying step.

[0111] The washing machine 1 according to the invention achieves important advantages.

[0112] Indeed, the washing machine makes it possible to significantly reduce water consumption, i.e. the total flow rate of water input from the external water supply network to ensure normal washing of the clothes, since the washing liquid can be reused throughout the washing cycle.

[0113] In addition, the washing machine also reduces electricity consumption, particularly during the management of washing cycles. This is mainly due to the fact that the tank 44 allows the washing liquid to be stored in temperature, and therefore the extensive use of heating means 7 is not required at all times.

[0114] In conclusion, the washing machine 1 avoids that the energy spent during the washing cycles, for example to heat the water, is dispersed outside the washing machine. Thus, the washing machine 1 according to the invention is more environmentally friendly and generally requires less energy for its operation, even managing to reduce the time required to perform the washing cycles.

[0115] The invention is susceptible to variations within the scope of the inventive concept as defined by the claims.

[0116] As mentioned above, the washing machine 1 can be effectively used for different types of washing, for example industrial washing.

[0117] In this respect, all details are substitutable by equivalent elements and the materials, shapes and dimensions can be any.

Claims

1. Washing machine (1) comprising:

- a loading conduit (2) capable of being placed in fluid passage connection with an external water network and configured to convey incoming water to said washing machine (1),
- a discharge conduit (3) suitable to be placed in fluid passage connection with an external water network and configured to convey a washing liquid including said water at the exit of said washing machine (1),
- a hydraulic circuit (4) in fluid passage connection with said conduits (2, 3) between said conduits (2, 3) and comprising:
 - a basin (40) configured to accumulate or discharge a predetermined volume of said washing liquid,
 - a centrifugal basket (41) placed in said basin (40) and suitable to contain a plurality of cloths,

- a first filter (42) placed downstream said basin (40) and configured to filter said washing liquid,

- a pump (43) arranged downstream of said first filter (42) and configured to convey said washing liquid at least towards said discharge conduit (3),

and **characterised by** further comprising

- a recycling conduit (5) in fluid passage connection with said pump (43) and said basin (40) between said pump (43) and said basin (40), and
- a second filter (6) configured to sanitize said washing liquid,

and by the fact that

- said circuit (4) further comprises:

- a tank (44) arranged between said first filter (42) and said pump (43) and configured to house at least said predetermined volume of said washing liquid, and

- a selector valve (45) arranged upstream of said recycling conduit (5) and of said discharge conduit (3) and configured to selectively place in fluid passage connection said circuit (4) and said recycling conduit (5) or said circuit (4) and said discharge conduit (3), and

- said second filter (6) is placed downstream of said tank (44).

2. Washing machine (1) according to claim 1, wherein said second filter (6) is arranged upstream of said pump (43) or is included in said recycling conduit (5) downstream of said pump (43).

3. Washing machine (1) according to claim 1, wherein said second filter (6) is configured to disinfect said washing liquid.

4. Washing machine (1) according to any one of the preceding claims, further comprising heating means (7) housed in said basin (40) and configured to heat said predetermined volume of said washing liquid in said basin (40).

5. Washing machine (1) according to any one of the preceding claims, wherein said tank (44) includes thermally insulated walls so as to reduce heat loss of said washing liquid in said tank (44).

6. Washing machine (1) according to any one of the preceding claims, further comprising electrical control means (8) accessible from external of said washing machine (1), operatively connected to at least said pump (43) and said selector valve (45) and con-

figured to control the alternative selection of one between said recycling conduit (5) and said discharge conduit (3).

7. Washing machine (1) according to any one of the preceding claims, further comprising handling means (9) mechanically connected to said basket (41) and comprising at least one rotary motor (90) operatively connected to said control means (8) and transmission means (91) configured to transmit the motion of said motor (90) to said basket (41). 5
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8. Washing machine (1) according to any one of the preceding claims, further comprising at least one removable drawer (10) comprising one or more housings (10a) in fluid passage connection with said circuit (4) upstream of said basin (40) and configured to accommodate each at least one detergent. 15
9. Washing machine (1) according to any one of the preceding claims, wherein said loading conduit (2) comprises at least a first valve (20) operatively connected to said control means (8) and configured to allow or obstruct the passage of said water into said loading conduit (2), each said housing (10a) is operatively connected to said control means (8) and connected to said circuit (4) by means of a second valve (10b) configured to allow or obstruct the outflow of said detergent from said housing (10a) and said basin (40) comprises a third valve (40a) operatively connected to said control means (8) and configured to allow or obstruct the outflow of said washing liquid from said basin (40). 20
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10. Washing process of cloths implemented by a washing machine (1) according to any one of the preceding claims, and comprising: 35
- conveying said washing liquid into said basin (40) until it reaches a predetermined volume in said basin (40), 40
 - moving said basket (41) in said basin (40),
- and **characterised by** comprising 45
- accumulating said washing liquid from said basin (40) in said tank (44) through said first filter (42),
 - conveying said washing liquid, by means of said pump (43), into one of said recycling conduit (5) and said discharge conduit (3) selected by means of said selector valve (45), and 50
 - sanitising said washing liquid by means of said second filter (6). 55

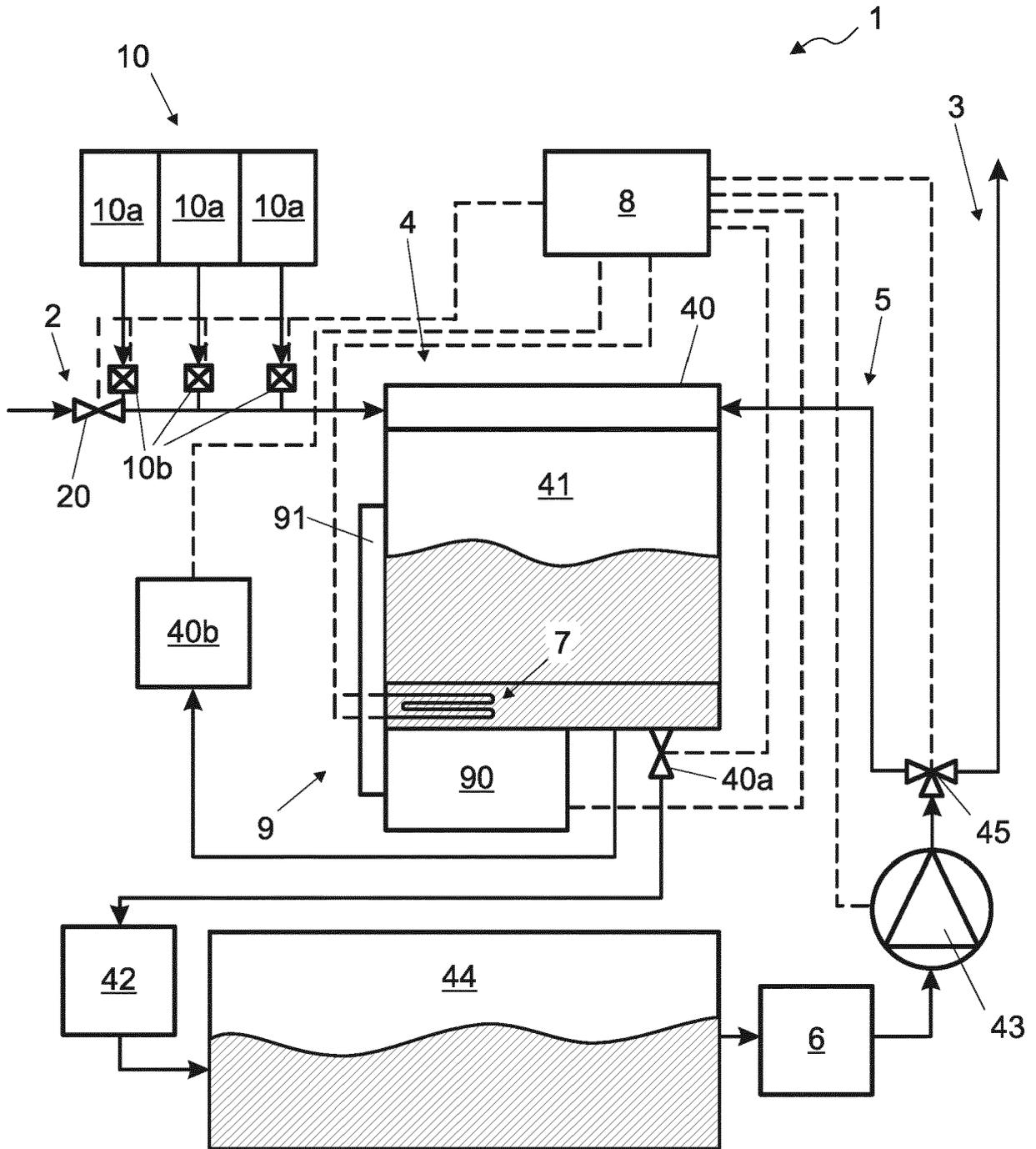


Fig. 1

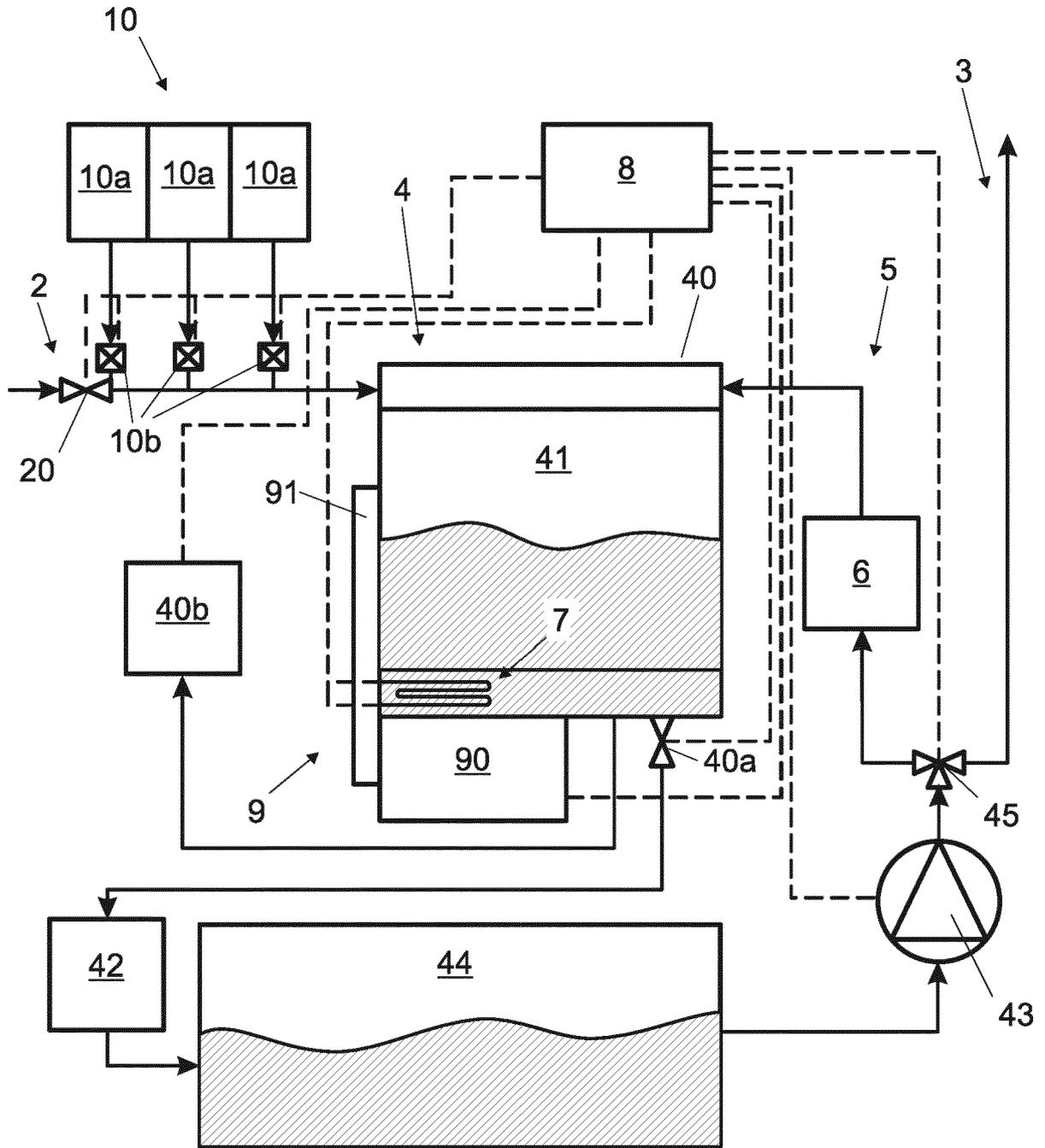


Fig. 2

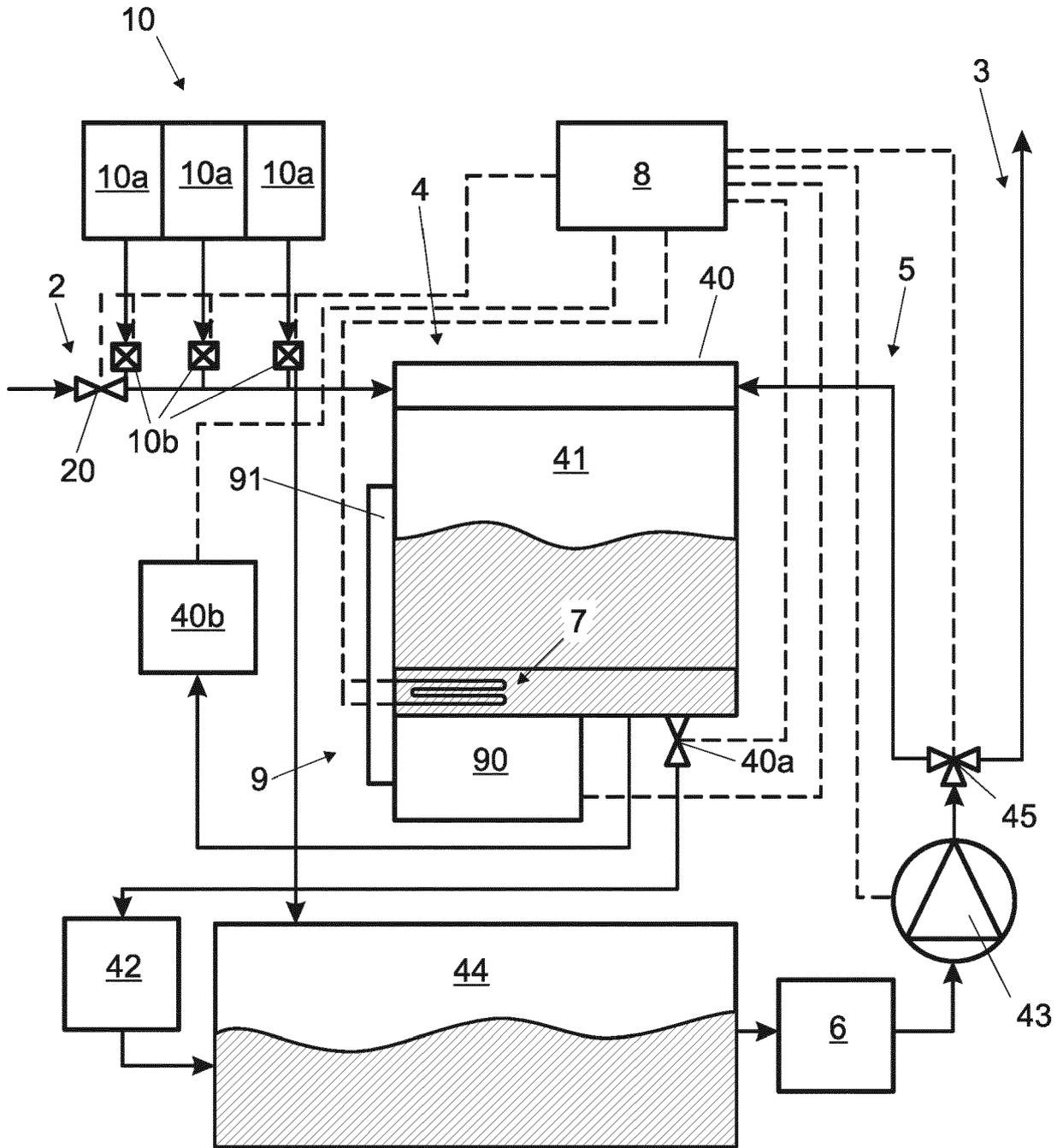


Fig. 3

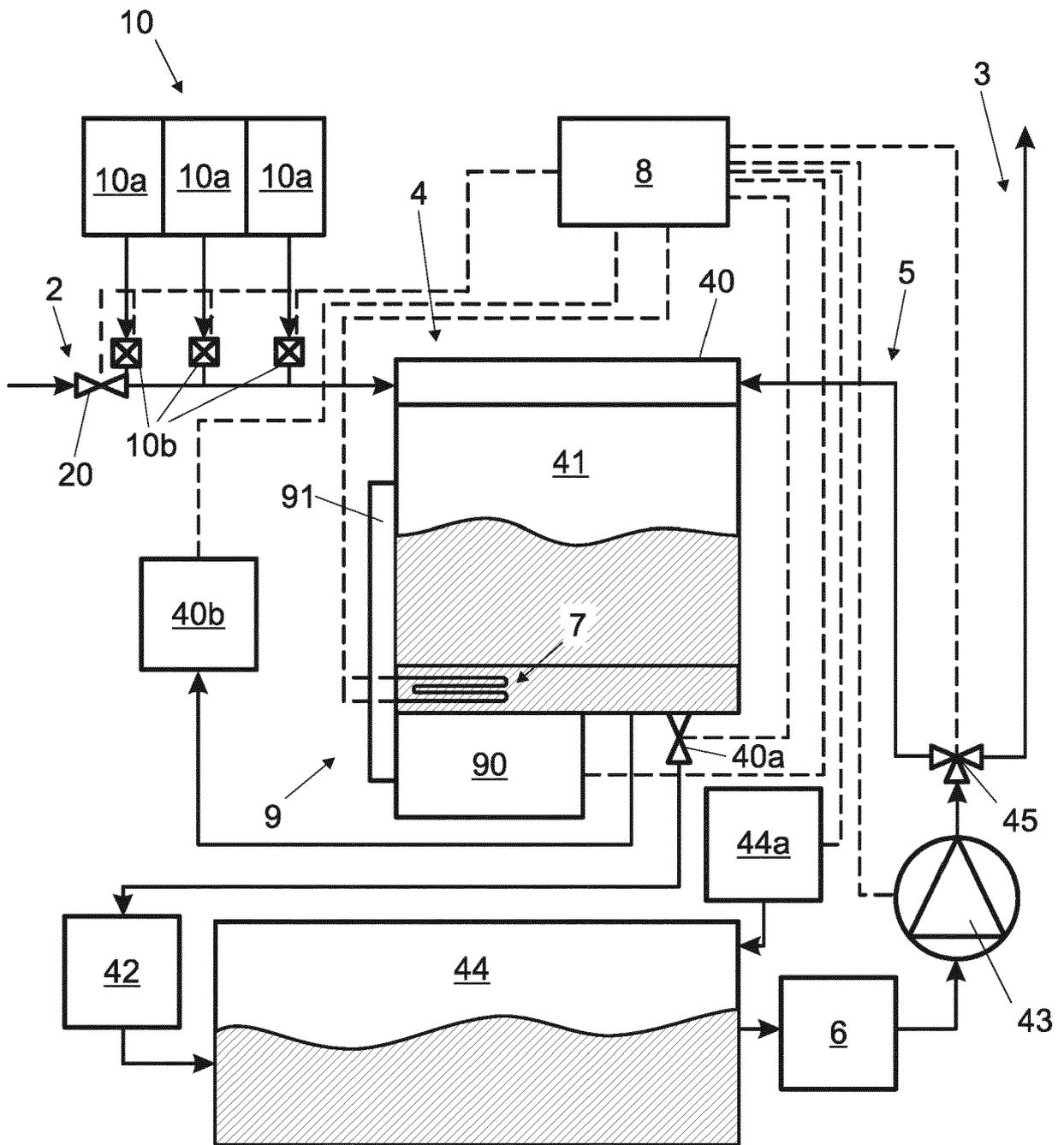


Fig. 4

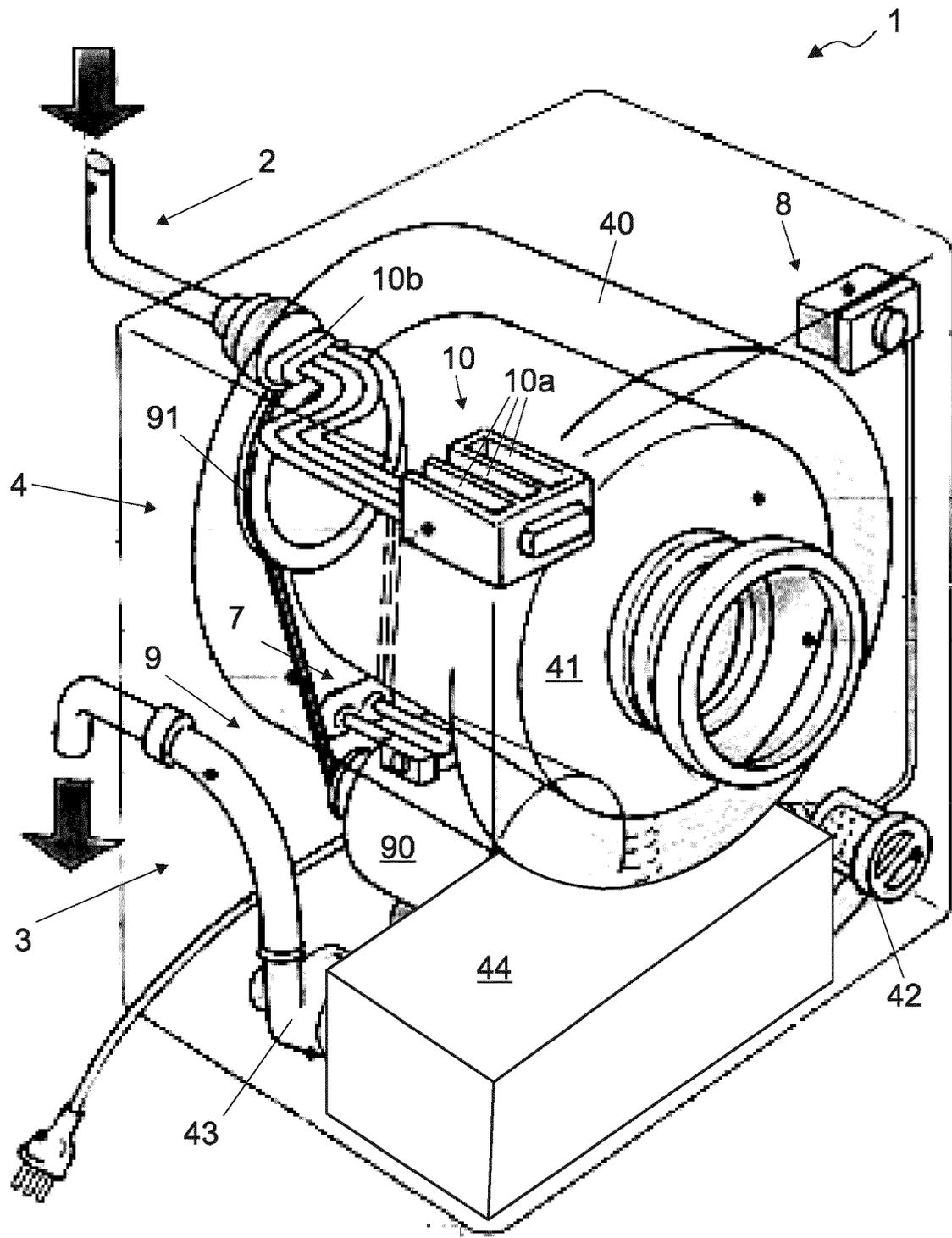


Fig. 5



EUROPEAN SEARCH REPORT

Application Number

EP 23 15 1946

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2020/337518 A1 (ALBERT TOBIAS [DE] ET AL) 29 October 2020 (2020-10-29) * paragraph [0004] * * paragraph [0048] - paragraph [0054]; figures 4-6 *	1-10	INV. D06F39/00 D06F39/08 D06F39/10
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Place of search

Date of completion of the search

Examiner

Munich

24 May 2023

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