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(54) **DISTRIBUTOR AND ELECTRICAL APPLIANCE EQUIPPED WITH SAID DISTRUBUTOR**

(57) The present invention provides a distributor (1) and an electrical appliance equipped with the distributor (1), wherein said distributor (1) comprises a valve module (11) provided with an inlet (19) and multiple outlets, a fluid flowing in through the inlet (19) of the valve module (11) and a distributor module (12), in which is provided a channel (121) connected directly to a corresponding outlet of the valve module (11) via a mechanical connecting part (1112).

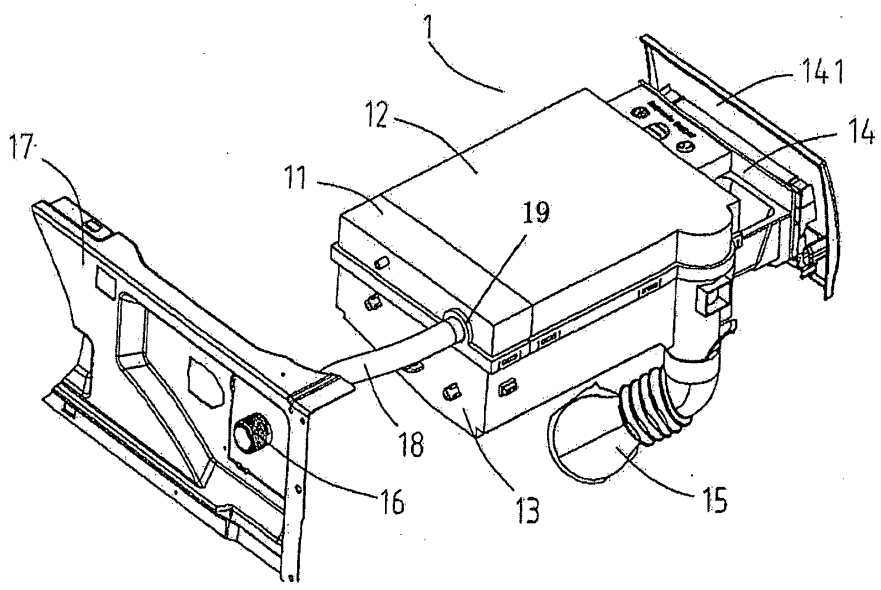

Fig. 1

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Description

Technical field

[0001] The present invention relates to a distributor and an electrical appliance equipped with the distributor.

Background art

[0002] In a conventional electrical appliance such as a washing machine, it is necessary to distribute water into different containers according to service operating conditions or user settings. For example, an existing washing machine comprises a distributor box, a treatment agent containers, and multiple valves which are respectively fixed to a housing. Different valve outlets are connected via pipes to corresponding inlets of the distributor box, each valve is electrically connected to a controller by means of a wiring harness, and the controller controls the opening/closing of the valve. At the part where a pipe is connected to each inlet/outlet, the pipe is fixed with a clamp.

[0003] When such a washing machine is being used, each valve is connected or disconnected according to signals from the controller, such that water flows into the required valve through a valve inlet, enters a corresponding inlet of the distributor box through a pipe connected to a valve outlet after flowing out of the valve, and flows into a corresponding box of the treatment agent container. Water that has been mixed with different treatment agents is collected in a collection chamber, and flows out through an outlet pipe to be used in the next operational step.

[0004] The inventors have found that an electrical appliance constructed in the manner described above has the following shortcomings:

> Since each valve must be connected to the distributor box and a main water inlet by pipes, a special-purpose clamp must be provided at the part where each pipe is connected to an inlet/outlet, to fix the pipe in place, and each valve must be connected to the controller by means of a wiring harness; hence, assembly is difficult, and the installation time and installation space are increased. Furthermore, due to the large number of pipes, clamps and wiring harnesses, the total cost of the electrical appliance is increased.

Content of the invention

[0005] To overcome one or more of the abovementioned shortcomings, a distributor must be provided.

[0006] According to one aspect of the present invention, a fluid distributor is provided, comprising: a valve module provided with an inlet and multiple outlets, a fluid flowing in through the inlet of the valve module; a distributor module, in which is provided a channel, characterized in that the channel is connected directly to a corresponding outlet of the valve module via a mechanical connecting part.

[0007] According to another aspect of the present invention, an electrical appliance comprising the abovementioned fluid distributor is provided, preferably the electrical appliance is a washing machine.

[0008] Favourable the fluid distributor comprises a controller for controlling the outflow of a fluid from a desired outlet of the valve module.

[0009] Favourable the fluid distributor comprises a treatment agent container module, the treatment agent container module having an accommodating part, the accommodating part being used to store a treatment agent and being in communication with a corresponding channel of the distributor module.

[0010] Favourable the valve module comprises a valve, the valve being disposed on the controller and being electrically connected to the controller. Preferably, the valve is fixed to the controller.

[0011] Favourable the valve module comprises a valve, the valve being fixed to a housing of the valve module and being electrically connected to the controller.

[0012] Favourable the valve module comprises a valve, the valve being fixed to a housing of the distributor module and being electrically connected to the controller.

[0013] Favourable the manner of the electrical connection comprises soldering, riveting, elastic connection and insertion connection.

[0014] Favourable the mechanical connecting part is a quick connector or an engagement connecting part.

[0015] Favourable a microcontroller unit is provided on the controller, the microcontroller unit being used to control operation of the valve module.

[0016] Favourable the valve module also comprises a metering pump, the metering pump being electrically connected to the controller, and the metering pump being able to pump a predetermined amount of a liquid treatment agent from a liquid treatment agent container into a fluid path according to a signal of the controller.

[0017] Favourable the valve module also comprises a detector, the detector being electrically connected to the controller, and the detector being able to detect the height of liquid treatment agent in the liquid treatment agent container.

[0018] Favourable a flow meter is provided in a fluid path, the controller is disposed close to the flow meter, and a sensing element is installed in a fixed manner on the controller in a position corresponding to the flow meter.

[0019] Favourable the flow meter comprises a vane wheel chamber and a vane wheel disposed in the vane wheel chamber, the vane wheel chamber being formed integrally with a fluid path, and a magnetic part being provided on the vane wheel.

[0020] Favourable the valve module comprises an actuator component, the actuator component comprising a motor, a valve core, an inlet and a housing; the valve

core is installed in the housing and can freely rotate in the housing, the housing is fixed and cannot move, the motor can drive the valve core to rotate around an axis thereof, multiple openings are provided in different axial positions on the valve core, outlets are provided on the housing in positions corresponding in the axial direction to the openings of the valve core, and the outlets of the housing are in communication with corresponding channels of the distributor module.

[0021] Favourable multiple openings of the valve core are separated by a predetermined angle in a circumferential direction.

[0022] Favourable multiple openings of the valve core are separated by the same angle in a circumferential direction. Preferably the fluid is water.

[0023] Favourable the fluid distributor comprises a collection chamber module for collecting a mixture of fluid and a treatment agent, the mixture flowing out through an outlet of the collection chamber module.

Description of the accompanying drawings

[0024] Other features of the present invention will be made obvious by the following explanation of demonstrative embodiments which makes reference to the accompanying drawings.

Fig. 1 is a structural schematic diagram of a distributor according to a first embodiment of the present invention.

Fig. 2 is a schematic perspective view of a local structure of the distributor according to the first embodiment of the present invention.

Fig. 3 is a structural schematic diagram of a distributor according to a second embodiment of the present invention.

Fig. 4 is a schematic perspective view of a local structure of a distributor according to a third embodiment of the present invention.

Fig. 5 is a schematic perspective view of a local structure of a distributor according to a fourth embodiment of the present invention.

Fig. 6 is a schematic perspective view of a local structure of a distributor according to a fifth embodiment of the present invention.

Fig. 7 is a schematic sectional view of a local structure of the distributor according to the fifth embodiment of the present invention.

Particular embodiments

[0025] Various embodiments of the present invention are described below with reference to the accompanying drawings. These embodiments are intended to illustrate the present invention, which is not limited to these embodiments.

[0026] A washing machine is taken as an example hereinbelow to describe an electrical appliance. It should be understood that the present invention is not limited to a washing machine, but may be applied to another type of electrical appliance having a distributor, e.g. a dishwasher, etc.

[0027] Words relating to description of direction, such as "up", "down", "left" and "right", are used hereinbelow purely to facilitate description with reference to the accompanying drawings, and do not constitute a limitation on the positions of various components.

First embodiment

[0028] Fig. 1 is a structural schematic diagram of a distributor according to a first embodiment of the present invention.

[0029] The distributor of the first embodiment is represented generally by the drawing label 1. The distributor 1 comprises a valve module 11, a distributor module 12, a collection chamber module 13, a treatment agent container module 14, an outlet 15 and a pipe 18. An inlet 19 of the valve module 11 is in communication with one end of the pipe 18, and another end of the pipe 18 is in communication with a water inlet 16 on a washing machine housing 17. One end of the outlet 15 is in communication with the collection chamber module 13, and another end leads water into a target region of the washing machine, e.g. a drum of the washing machine. The valve module 11 and distributor module 12 are arranged side by side on the left and right, and are together disposed above the collection chamber module 13.

[0030] Fig. 2 is a schematic perspective view of a local structure of the distributor according to the first embodiment of the present invention. In Fig. 2, the structure of the valve module 11 is shown in detail.

[0031] The valve module 11 comprises a valve 111, such as a solenoid valve, wherein the valve 111 is electrically connected to the controller 113. The valve 111 is shown as being cylindrical, but could also be another shape, e.g. cuboid-shaped. Fig. 2 shows two valves disposed side by side, but a greater number of valves could also be provided. The cylindrical valve 111 is arranged such that a longitudinal direction thereof parallel to a cylinder generatrix is perpendicular to a plane of the controller 113, with the valve 111 being located above the controller 113. The valve 111 is electrically connected to the controller 113 in a known manner. This manner may be soldering, riveting, elastic connection, or insertion connection, etc. In one example, a pin 1111 of the valve 111 is fixed by soldering to the controller 113. In another example, the pin 1111 of the valve is an elastic plate, which bears against an electrode of the controller 113 elastically; or an elastic plate is soldered to the controller,

and pushes against the pin 1111 of the valve. Thus the valve and controller may be separated, facilitating maintenance. In another example, the pin 1111 of the valve is a U-shaped elastic socket, and a gold finger of the controller is inserted into the elastic socket. In this way the valve 111 is electrically connected to the controller 113, and signals can be transmitted directly between the valve 111 and the controller 113, thereby eliminating the wiring harness that is used in the prior art to connect the valve to the controller, and therefore shortening the installation process, reducing the installation space and lowering costs. It is also conceivable for the valve 111 to be fixed to a housing of the valve module or a housing of the distributor module.

[0032] An inlet of each valve 111 is in communication with the inlet 19 of the valve module 11; an outlet of each valve 111 is connected, at a connecting part 1112, with a corresponding one of multiple channels 121 of the distributor module 12. A known method of mechanical connection may be employed at the connecting part 1112 to connect the outlet of the valve 111 directly to the channel 121, e.g a quick connector or engagement connection, etc. A sealing component such as an O-ring is provided at the connecting part 1112, to prevent leakage of water. Since the connecting part 1112 between the valve outlet and the distributor module channel employs a mechanical connection, the pipe used in the prior art to connect the valve to the distributor is eliminated, therefore shortening the installation process, reducing the installation space and lowering costs.

[0033] A microcontroller unit (MCU) 1131 and an interface 112 are provided on the controller 113. The interface 112 protrudes outside the valve module 11, and is electrically connected to a central processing unit of the washing machine via a wiring harness, in order to be used for supplying power to the controller 113 and communication.

[0034] The MCU 1131 controls the opening/closing of each valve 111 according to signals from the central processing unit of the washing machine, so as to guide water into different channels 121.

[0035] Reference is now made to Fig. 1 again. The treatment agent container module 14 has multiple boxes, used for storing treatment agents such as detergent and softener; the treatment agents may be liquid or solid. Each box is in communication with a corresponding channel 121 of the distributor module 12.

[0036] The treatment agent container module 14 is accommodated in the collection chamber module 13, and can be pulled out of, and pushed into, the collection chamber module 13. A handle 141 is provided on the treatment agent container module 14, making it easy for a consumer to pull out the treatment agent container module 14, so as to replenish or change treatment agent.

[0037] When the washing machine is being used, the MCU 1131 receives signals from the central processing unit of the washing machine, according to service operating conditions of the washing machine or user settings, and controls the opening/closing of each valve 111. Water flowing in through the water inlet 16 of the washing machine flows through the pipe 18 to the inlet 19 of the valve module 11, and then flows into a valve 111 which is open. Water flows from the outlet of the open valve 111 into the corresponding channel 121 of the distributor module 12 through the connecting part 1112, and enters the corresponding box of the treatment agent container module 14. The water mixes with the corresponding treatment agent in the box, and is collected in the collection chamber module 13. Finally, the mixture of water and treatment agent collected in the collection chamber module 13 flows through the outlet 15 to a target region, such as the drum, of the washing machine, thereby completing the distribution process.

[0038] It must be pointed out that the relationship, in terms of spatial position, among the valve module, distributor module and collection chamber module in the present invention is not limited to that shown in the drawings; it is only required that an appropriate water flow path can be realized among them. For example, the collection chamber module 13 and the distributor module 12 may be arranged one above the other, and disposed together to the right of the valve module 11.

Second embodiment

[0039] Fig. 3 is a structural schematic diagram of a distributor according to a second embodiment of the present invention. In the description of the second embodiment, for the sake of simplicity, elements which have the same function as in the first embodiment are not described in detail again.

[0040] The distributor of the second embodiment is represented generally by the drawing label 2. The distributor 2 comprises a valve module 21, a distributor module 22, a collection chamber module 23, a treatment agent container module 24 and an outlet 25.

[0041] The second embodiment differs from the first embodiment in that an inlet of the valve module 21 is connected directly to a water inlet 26 on a washing machine housing 27 by a mechanical connection, e.g. a quick connector or engagement connection, etc. Such an arrangement enables water to flow into the valve module directly from the water inlet of the washing machine, thereby eliminating the pipe used in the first embodiment to connect the valve module inlet to the washing machine water inlet, and therefore shortening the assembly process and lowering costs.

Third embodiment

[0042] Fig. 4 is a schematic perspective view of a local structure of a distributor according to a third embodiment of the present invention. In the description of the third embodiment, for the sake of simplicity, elements which have the same function as in the first embodiment are not described in detail again.

[0043] The third embodiment differs from the first embodiment in that a valve module of a distributor 3 further comprises a metering pump or metering valve 318 and a detector 319. The metering pump 318 and detector 319 are electrically connected to a controller 313. The metering pump 318 is used for pumping a liquid treatment agent from a container (not shown) containing liquid treatment agent into a water path of the distributor. A large amount of liquid treatment agent is stored in the liquid treatment agent container, and may be used in multiple washing operations in the washing machine.

[0044] The detector 319 is used for detecting the height of liquid treatment agent in the liquid treatment agent container, and when the amount of liquid treatment agent is less than a predetermined amount, sending a signal to the controller 313; a signal is then transmitted to a central processor unit of the washing machine, causing the central processor unit to notify the user that the amount of liquid treatment agent is insufficient.

[0045] In a single clothes-washing operation of the washing machine, the metering pump 318 can, under the control of an MCU, automatically pump a predetermined amount of liquid treatment agent from the liquid treatment agent container into a water path, thereby relieving the user of the trouble of manually adding liquid treatment agent each time. Compared with the case where the user adds liquid treatment agent manually, this embodiment can guarantee the amount of liquid treatment agent added more precisely.

[0046] In addition, the user can still add powdered treatment agent to an additional treatment agent container as required; a powdered treatment agent container is in communication with a channel 321 of the distributor module, and when a corresponding valve 311 opens, powdered treatment agent can mix with water for use in the next operational step.

[0047] According to the structure described above, through the integration of the metering pump 318 and the detector 319 on a controller 313 of the valve module, the use of pipes and wiring harnesses during installation of the metering pump and detector is reduced, thereby saving space and reducing costs.

Fourth embodiment

[0048] Fig. 5 is a schematic perspective view of a local structure of a distributor according to a fourth embodiment of the present invention. In the description of the fourth embodiment, for the sake of simplicity, elements which have the same function as in the first embodiment are not described in detail again.

[0049] In the distributor 4 according to the fourth embodiment, a valve module is provided with a flow meter 416 in a water path. The flow meter 416 may comprise a vane wheel chamber, and a vane wheel that is disposed in the vane wheel chamber and capable of being activated by water flow. As Fig. 5 shows, the flow meter 416 is in communication with an inlet of the valve module. A cylindrical valve 411 is arranged such that a longitudinal direction thereof parallel to a cylinder generatrix is parallel to a plane of a controller 413, with the valve 411 being located below the controller 413. The vane wheel chamber of the flow meter 416 is arranged integrally with a water path of the valve module. A magnetic part is provided on a vane wheel of the flow meter 416. The controller 413 is disposed close to the flow meter 416. A sensing element 417, which senses rotation of the vane wheel, is installed on the controller 413 in a position facing the flow meter 416. The sensing element 417 and flow meter 416 are separated by a predetermined distance which is generally set to be as small as possible. The sensing element 417 is for example a Hall element.

[0050] In the course of water intake into the washing machine, when water flows into the inlet of the valve module, the vane wheel and the magnetic part thereof rotate with the flow of water. The sensing element 417 senses the rotation of the vane wheel, and transmits a signal to the controller 413; the controller 413 then outputs a signal through an interface 412 to a central processor unit of the washing machine, and the flow rate of incoming water is obtained by a predetermined algorithm.

[0051] Compared with a conventional structure in which a sensing element is connected to a controller by a wiring harness and a flow meter is connected to a valve module by a pipe, the structure of this embodiment does not require the connection of a wiring harness or a connecting pipe, and therefore simplifies assembly while reducing costs.

Fifth embodiment

[0052] Fig. 6 is a schematic perspective view of a local structure of a distributor according to a fifth embodiment of the present invention. Fig. 7 is a schematic sectional view of a local structure of the distributor according to the fifth embodiment of the present invention.

[0053] Unlike in the first to the fourth embodiments, as Fig. 6 shows, an actuator component 511 is provided in a valve module 51 of the distributor 5 of the fifth embodiment; the actuator component serves a function similar to multiple valves, being used to guide water, according to signals of a controller 513, into corresponding channels 521 in a distributor module.

[0054] As Fig. 7 shows, the actuator component 511 comprises a motor 5111, a valve core 5112, an inlet 5113 and a housing 5114. The valve core 5112 and housing 5114 are concentric hollow cylinders; the valve core 5112 is installed in the housing 5114 and can freely rotate in the housing 5114. The housing 5114 is fixed and does not move. The inlet 5113 has one end in communication with a water inlet of the washing machine, and another end in communication with the valve core 5112. The motor 5111 is connected to the valve core 5112 and can drive the valve core 5112 to rotate around an axis thereof. The motor 5111 is electrically connected to the controller 513 and receives a control signal from the controller 513.

[0055] Multiple openings are provided in different axial positions on the valve core 5112. These openings are separated by predetermined angles on the circumference of the valve core 5112, preferably by the same circumferential angle. Three openings 5112-1, 5112-1' and 5112-1" (shown by the dotted line) are shown schematically in Fig. 7; they are separated by a circumferential angle of 120°C. Outlets 5114-1, 5114-1' and 5114-1" are provided on the housing 5514 in positions which correspond in the axial direction to the openings 5112-1, 5112-1' and 5112-1" of the valve core 5112. The outlets 5114-1, 5114-1' and 5114-1" are located in the same position in the circumferential direction of the housing 5114, and are in communication with corresponding channels 521 in the distributor module.

[0056] During operation of the washing machine, the motor 5111 drives the valve core 5112 to rotate through a predetermined angle according to a signal from the controller 513, such that a desired opening of the valve core 5112 is in communication with a corresponding outlet of the housing 5114. For example, in the position shown in Fig. 7, opening 5112-1 of the valve core 5112 is in communication with outlet 5114-1 of the housing 5114. Suppose that in the position shown in Fig. 7, a rotation angle θ ($0° \leq \theta \leq 360°$) of the motor 5111 is 0°; then when $\theta = 0°$, opening 5112-1 is in communication with outlet 5114-1, and water flows out through outlet 5114-1; when $\theta = 120°$, opening 5112-1' is in communication with outlet 5114-1', and water flows out through 5114-1'; when $\theta = 240°$, opening 5112-1" is in communication with outlet 5114-1", and water flows out through 5114-1". When θ is any value different from the values given above, water does not flow out of the actuator component 511.

[0057] Thus, by having the controller 513 control the motor 5111 to rotate through different rotation angles, water can be guided to flow through different outlets into corresponding channels of the distributor module, or a water path can be cut off.

[0058] It is also conceivable for multiple axially separated openings to be provided in a certain circumferential position of the valve core 5112, such that when the valve core 5112 rotates to a certain angle, these openings in the same circumferential position are simultaneously in communication with corresponding outlets of the housing, so that water flows out through multiple outlets of the housing.

[0059] Through the structure described above, the valves in the first to the fourth embodiments are eliminated, construction is simple, and costs are reduced.

[0060] Some embodiments of the present invention are described above. It should be understood that the present invention is not limited to the particular structures of these embodiments; a person skilled in the art could, after reading the description, make other amendments and modifications as required.

[0061] For example, the distributor of the present invention is not limited to distributing water, but may also be used for distributing other fluids. In addition, the controller could be electrically connected to a valve by a wiring harness instead of being disposed in a valve module.

[0062] It must be understood that the present invention is not limited to the demonstrative embodiments disclosed. The scope of the following claims should be afforded the broadest interpretation, and includes all equivalent structures and functions.

Claims

1. Fluid distributor for an electrical appliance, comprising:

   a valve module provided with an inlet and multiple outlets, a fluid flowing in through the inlet of the valve module;
   a distributor module, in which is provided a channel,
   characterized in that the channel is connected directly to a corresponding outlet of the valve module via a mechanical connecting part.

2. Fluid distributor according to Claim 1, **characterized by** further comprising a controller for controlling the outflow of a fluid from a desired outlet of the valve module.

3. Fluid distributor according to Claim 1 or 2, **characterized by** further comprising a treatment agent container module, the treatment agent container module having an accommodating part, the accommodating part being used to store a treatment agent and being in communication with a corresponding channel of the distributor module.

4. Fluid distributor according to one of the preceding claims, **characterized in that** the valve module comprises a valve, the valve being disposed on the controller and being electrically connected to the controller.

5. Fluid distributor according to one of the preceding claims, **characterized in that** the valve module comprises a valve, the valve being fixed to a housing of the valve module and being electrically connected to the controller.

6. Fluid distributor according to one of the preceding claims, **characterized in that** the valve module comprises a valve, the valve being fixed to a housing of the distributor module and being electrically connected to the controller.

7. Fluid distributor according to one of the preceding claims, **characterized in that** the mechanical connecting part is a quick connector or an engagement

connecting part.

8. Fluid distributor according to one of the preceding claims, **characterized in that** a microcontroller unit is provided on the controller, the microcontroller unit being used to control operation of the valve module.

9. Fluid distributor according to one of the preceding claims, **characterized in that** the valve module also comprises a metering pump, the metering pump being electrically connected to the controller, and the metering pump being able to pump a predetermined amount of a liquid treatment agent from a liquid treatment agent container into a fluid path according to a signal of the controller.

10. Fluid distributor according to one of the preceding claims, **characterized in that** the valve module also comprises a detector, the detector being electrically connected to the controller, and the detector being able to detect the height of liquid treatment agent in the liquid treatment agent container.

11. Fluid distributor according to one of the preceding claims, **characterized in that** a flow meter is provided in a fluid path, the controller is disposed close to the flow meter, and a sensing element is installed in a fixed manner on the controller in a position corresponding to the flow meter.

12. Fluid distributor according to Claim 11, **characterized in that** the flow meter comprises a vane wheel chamber and a vane wheel disposed in the vane wheel chamber, the vane wheel chamber being formed integrally with a fluid path, and a magnetic part being provided on the vane wheel.

13. Fluid distributor according to one of the preceding claims, **characterized in that** the valve module comprises an actuator component, the actuator component comprising a motor, a valve core, an inlet and a housing; the valve core is installed in the housing and can freely rotate in the housing, the housing is fixed and cannot move, the motor can drive the valve core to rotate around an axis thereof, multiple openings are provided in different axial positions on the valve core, outlets are provided on the housing in positions corresponding in the axial direction to the openings of the valve core, and the outlets of the housing are in communication with corresponding channels of the distributor module.

14. Fluid distributor according to Claim 13, **characterized in that** multiple openings of the valve core are separated by a predetermined angle in a circumferential direction.

15. Fluid distributor according to Claim 13 or 14, **characterized in that** multiple openings of the valve core are separated by the same angle in a circumferential direction.

16. Fluid distributor according to one of the preceding claims, **characterized by** further comprising a collection chamber module for collecting a mixture of fluid and a treatment agent, the mixture flowing out through an outlet of the collection chamber module.

17. Electrical appliance, **characterized by** comprising the fluid distributor according to any one of Claims 1 - 16, preferably the electrical appliance is a washing machine.

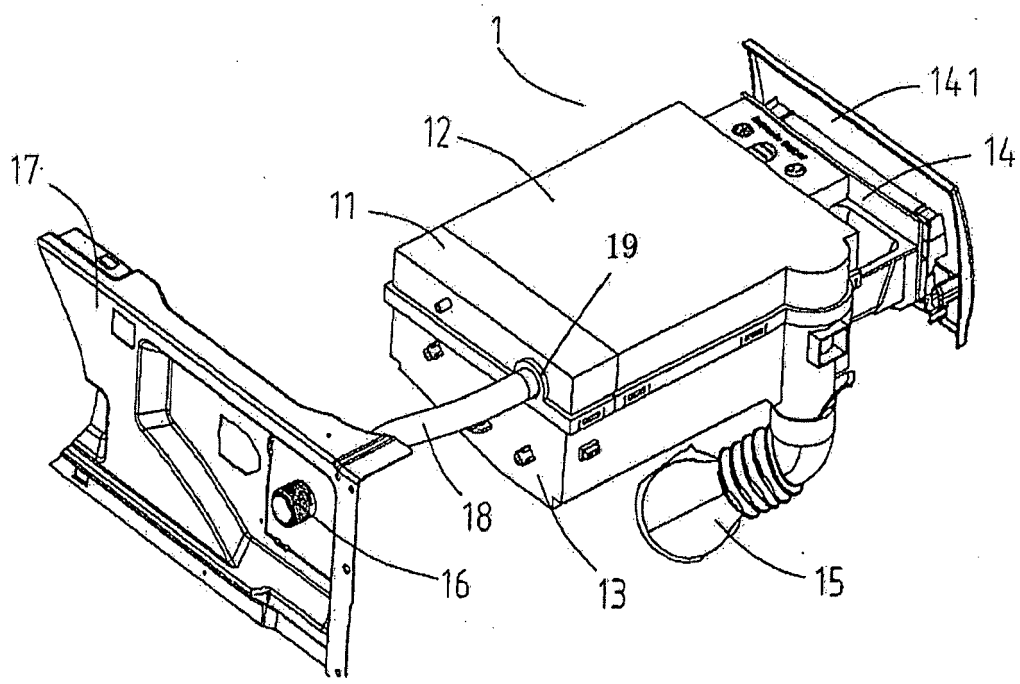

Fig. 1

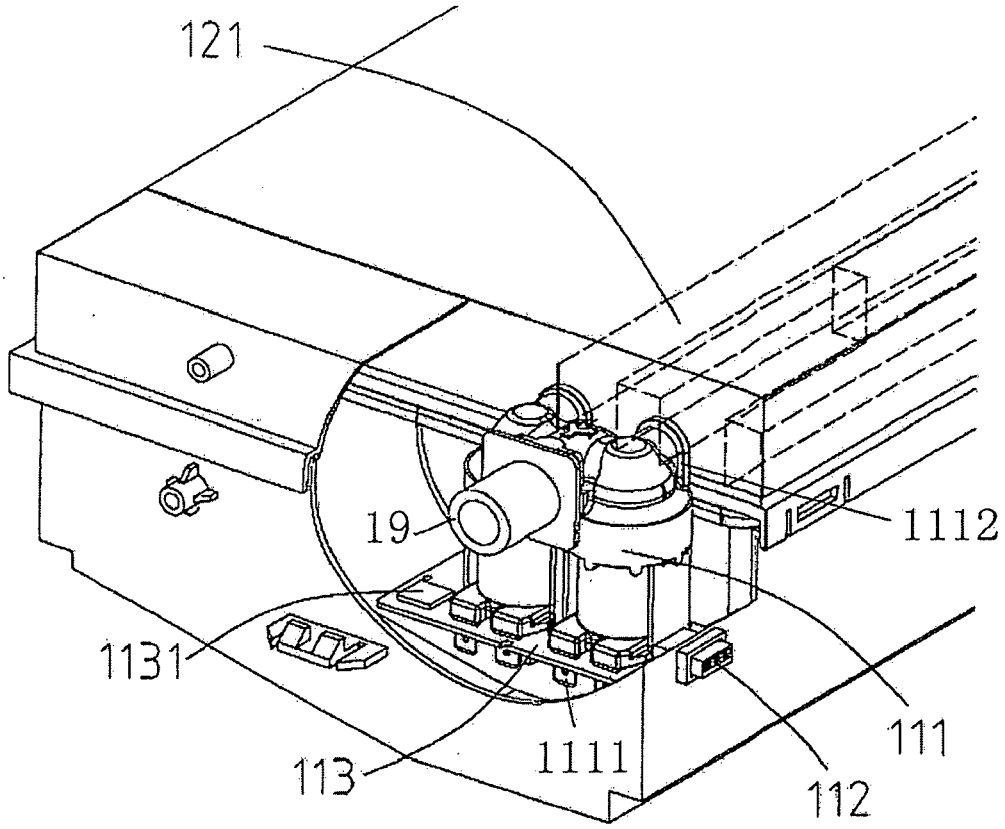

Fig. 2

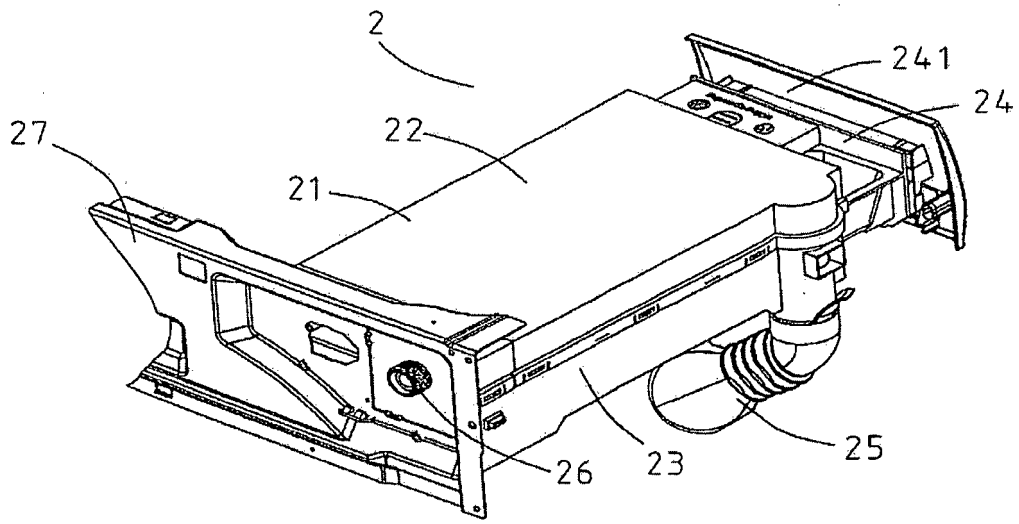

Fig. 3

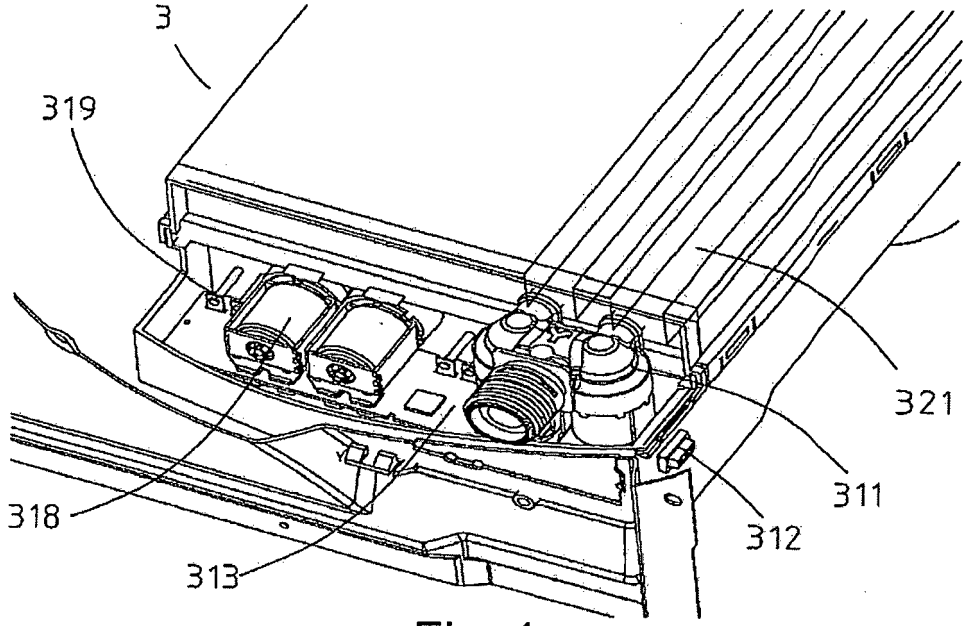

Fig. 4

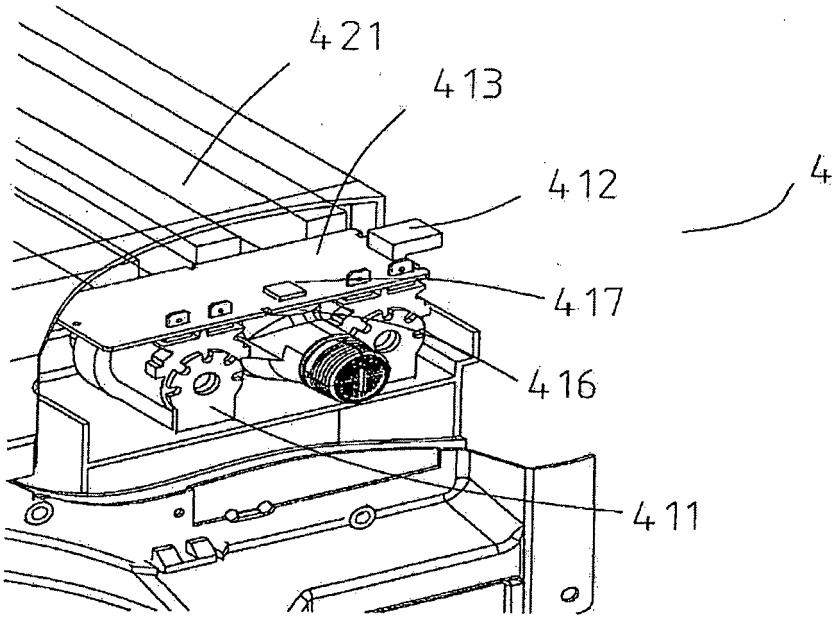

Fig. 5

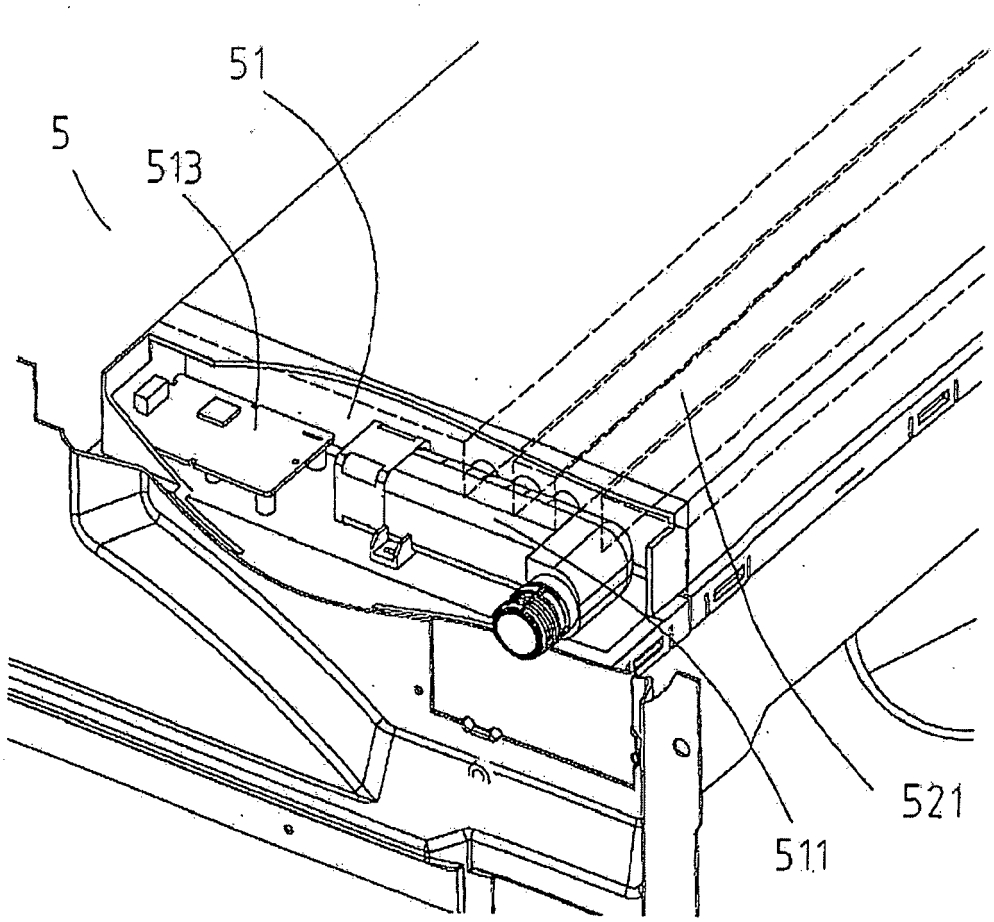

Fig. 6

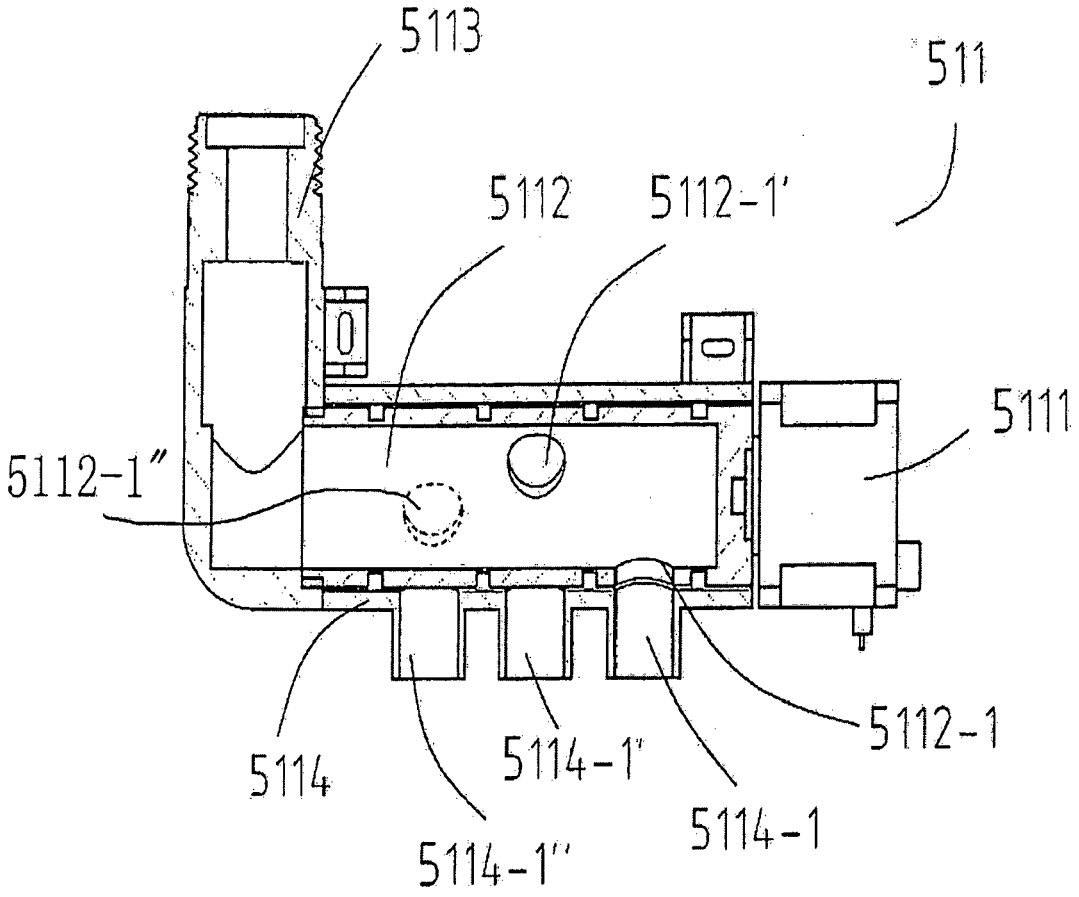

Fig. 7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 00 1250

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 Y A	WO 2016/078719 A1 (ELECTROLUX APPLIANCES AB [SE]) 26 May 2016 (2016-05-26) * page 1 lines 6-9; page 9, line 18 - page 10, line 19; page 15, line 13 - page 25, line 29; claims; figures 5-8 * -----	1,2,4-8, 13-17 3 9-12	INV. D06F39/02
Y A	US 2006/081016 A1 (HSU FENG-LUNG G [US] ET AL) 20 April 2006 (2006-04-20) * paragraphs [0001], [0037] - [0045]; claims; figures 3-9 * -----	3 1,2,4-17	
A	US 4 981 024 A (BELDHAM PAUL M [US]) 1 January 1991 (1991-01-01) * the whole document * -----	1-17	

TECHNICAL FIELDS SEARCHED (IPC)

D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 February 2018	Clivio, Eugenio

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
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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
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01-02-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016078719 A1	26-05-2016	EP 3221499 A1	27-09-2017
		US 2017321368 A1	09-11-2017
		WO 2016078719 A1	26-05-2016
US 2006081016 A1	20-04-2006	AR 051640 A1	31-01-2007
		AT 524594 T	15-09-2011
		AU 2005297563 A1	27-04-2006
		BR PI0516622 A	16-09-2008
		CA 2580143 A1	27-04-2006
		EP 1802800 A1	04-07-2007
		ES 2373670 T3	07-02-2012
		US 2006081016 A1	20-04-2006
		WO 2006042631 A1	27-04-2006
US 4981024 A	01-01-1991	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82