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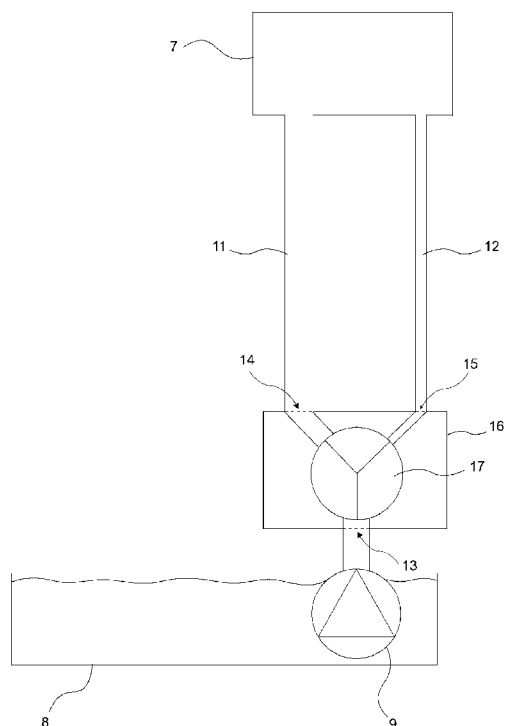
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- (54) **Title:** A LAUNDRY DRYER AND FIBER AND LINT CLEANING METHOD

Figure 2



(57) **Abstract:** The present invention relates to a laundry dryer (1) comprising a body (2); a drum (3) wherein the laundry to be dried is placed; an air circulation duct (4) providing the delivery of the drying air onto the laundry in the drum (3); a heat exchanger (5), for example an evaporator, that is disposed on the air circulation duct (4) and that enables the temperature of the drying air to be changed; at least one filter (6) that holds fiber, lint and dust in the drying air; a tank (7) wherein the water condensed is stored; a drainage channel (8) wherein the water draining from the heat exchanger (5) and the filter (6) washed with the water taken from the tank (7) and mixed with fiber, lint and dust is collected, and a discharge pump (9) that transfers the water accumulated in the drainage channel (8) into the tank (7).

Description**A LAUNDRY DRYER AND FIBER AND LINT CLEANING METHOD**

- [0001] The present invention relates to a fiber and lint cleaning method and a laundry dryer wherein fiber and lint accumulating on the heat exchanger and the filter removed.
- [0002] While the laundry is being dried in the laundry dryer, fiber, lint and dust break off from the laundry particularly due to mechanical effects. In conventional laundry dryers, most of the fiber, lint and dust are collected by means of one or more than one filter disposed on the laundry dryer, thus preventing these particles from accumulating on the heat exchanger and other components. The water, that is evaporated from over the laundry and condensed in the heat exchanger during the drying cycle, is collected in a tank disposed on the laundry dryer. In the state of the art, use of the water collected in the tank for the cleaning of components such as the filter, the heat exchanger, etc. is disclosed.
- [0003] In the state of the art, after the washing of the components such as filter, heat exchanger, etc., fiber, lint and dust accumulating thereon are removed. These particles removed should be transferred to the tank together with water. While the water is sucked by the discharge pump and pumped into the discharge channel, the particles in the water may accumulate at the narrow sections of the discharge channel and at the suction port of the discharge pump. In this case, the outlet of the discharge pump gets clogged, preventing the efficient operation of the system. If a pipe with a large diameter is used at the outlet of the discharge pump, the lints can be transferred to the tank together with water without causing clogging; however, when the discharge pump stops operating, the water remaining between the tank and the discharge pump moves in the reverse direction with the effect of gravity and is emptied back into the discharge channel. When a hose with a small diameter is used to transfer the water into the tank, this time, the outlet of the discharge pump is clogged.
- [0004] In the state of the art, various methods are developed for facilitating the discharge of fiber, lint and dust accumulating on components such as filter, heat exchanger, etc. after the washing of these components.

- [0005] The state of the art International Patent Applications No. WO2012146533 and WO2012146534 relate to a heat pump laundry dryer an evaporator that condenses the humid processing air; a condenser that is placed into the ventilation duct and that heats the processing air dehumidified at the evaporator; a pump that enables the condensate water to be discharged, and a drain channel that extends between the evaporator and the condenser and that enables the condensate water coming from the evaporator to be delivered to the pump in order to be discharged.
- [0006] The aim of the present invention is the realization of a fiber and lint cleaning method and a laundry dryer wherein the water containing fiber, lint and dust therein is discharged to the tank without causing any clogging.
- [0007] The laundry dryer realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a flow control means that is disposed between the discharge pump and the tank and two hoses connected to the flow control means, one thereof having a small diameter and the other having a large diameter. By using hoses with two different diameters, the clogging of the outlet of the discharge pump is prevented and the amount of water returning to the discharge channel is decreased since the amount of water remaining in the hose when the discharge pump is stopped is minimized.
- [0008] In an embodiment of the present invention, the flow control means comprises a three-way valve whereto two hoses with different diameters are mounted.
- [0009] In another embodiment of the present invention, the flow control means comprises two two-way valve whereto two hoses with different diameters are mounted.
- [0010] In the fiber and lint cleaning method of the present invention, the filter, the heat exchanger and other components whereon the fiber and lint are accumulated are washed with the water from the tank wherein the condensate water is accumulated and the water draining therefrom is accumulated in a drainage channel. The first outlet with larger diameter of the flow control means is opened and the second outlet thereof with

smaller diameter is closed, thus the water mixed with fiber, lint and dust is delivered to the tank from the first hose. After being filtered by means of the known methods, the water in the tank flows into the drainage channel with the effect of gravity. Afterwards, the first outlet with larger diameter of the flow control means is closed and the second outlet thereof with smaller diameter is opened, thus the cleaned water is delivered to the tank from the second hose with smaller diameter.

[0011] By means of the present invention, the water containing fiber, lint and dust therein is first transferred to the tank by means of the hose with a larger diameter and then transferred into the tank by means of the narrow hose. Thus, during the discharge of the water containing a significant amount of fiber, lint and dust, almost all particles are enabled to be transferred to the tank without any clogging, since less amount of water remains in the narrow hose when the discharge pump is stopped, the amount of water returning to the drainage channel is decreased.

[0012] The laundry dryer and the fiber and lint cleaning method realized in order to attain the aim of the present invention are illustrated in the attached figures, where:

[0013] Figure 1 – is the schematic view of the laundry dryer of the present invention.

[0014] Figure 2 - is the schematic view of the discharge pump, the flow control means and the first and second hoses.

[0015] Figure 3 - is the schematic view of the discharge pump, the flow control means and the first and second hoses in another embodiment of the present invention.

[0016] The elements illustrated in the figures are numbered as follows:

1. Laundry dryer
2. Body
3. Drum
4. Air circulation duct
5. Heat exchanger
6. Filter
7. Tank

8. Drainage channel
9. Discharge pump
10. Control unit
11. First hose
12. Second hose
13. Water inlet
14. First outlet
15. Second outlet
16. Flow control means
17. Three way valve
18. Two way valve

[0017] The laundry dryer (1) of the present invention comprises a body (2); a drum (3) wherein the laundry to be dried is placed; an air circulation duct (4) providing the delivery of the drying air onto the laundry in the drum (3); a heat exchanger (5), for example an evaporator, that is disposed on the air circulation duct (4) and that enables the temperature of the drying air to be changed; at least one filter (6) that holds fiber, lint and dust in the drying air; a tank (7) wherein the water condensed in the heat exchanger (5) is stored; a drainage channel (8) wherein the water draining from the heat exchanger (5) and the filter (6) washed with the water taken from the tank (7) and mixed with fiber, lint and dust is collected; a discharge pump (9) that transfers the water accumulated in the drainage channel (8) into the tank (7), and a control unit (10).

[0018] The laundry dryer (1) of the present invention comprises

[0019] - a first hose (11) that is disposed between the discharge pump (9) and the tank (7) and that transfers the water mixed with fiber, lint and dust taken from the drainage channel (8) by the discharge pump (9) and a second hose (12) with a smaller diameter than the first hose (11), that is disposed between the discharge pump (9) and the tank (7), and

[0020] - a flow control means (16) that has a water inlet (13) connected to the discharge pump (8), a first outlet (14) connected to the first hose (11) and a second outlet (15) connected to the second hose (12) and that enables the water accumulated in the drainage channel (8) during the washing of

fiber, lint and dust into the tank (7) by means of the first hose (11) and the second hose (12) respectively.

[0021] In an embodiment of the present invention, the flow control means (16) comprises a three way valve (17) that is connected to the water inlet (13), the first outlet (14) and the second outlet (15) and that enables the water taken from the water inlet (13) to be directed to the first hose (11) through the first outlet (14) or to the second hose (12) through the second outlet (15).

[0022] In another embodiment of the present invention, the flow control means (16) comprises two two way valves (18) that are connected between the water inlet (13) and the first outlet (14) and between the water inlet (13) and the second outlet (15) and that enables the water taken from the water inlet (13) to be directed to the first hose (11) through the first outlet (14) or to the second hose (12) through the second outlet (15).

[0023] The fiber and lint cleaning method executed by the control unit (10) in the laundry dryer (1) of the present invention comprises the following steps:

[0024] - washing the fiber, lint and dust accumulating on the filter (6) and the heat exchanger (5) with the water taken from the tank (7) and accumulating the water draining therefrom in the drainage channel (8);

[0025] - opening the first outlet (14) of the flow control means (16) and closing the second outlet (15) thereof;

[0026] - operating the discharge pump (9);

[0027] - transferring the water mixed with fiber, lint and dust in the drainage channel (8) to the tank (7) by means of the first hose (11) with larger diameter;

[0028] - stopping the discharge pump (9) and delivering the water cleansed from fiber, lint and dust in the tank (7) into the drainage channel (8);

[0029] - closing the first outlet (14) of the flow control means (16) and opening the second outlet (15) thereof;

[0030] - operating the discharge pump (9);

[0031] - transferring the clean water in the drainage channel (8) to the tank (7) by means of the second hose (12) with smaller diameter;

[0032] - stopping the discharge pump (9);

[0033] The lint and fiber cleaning method is realized in three stages in the laundry dryer (1) of the present invention. In the first stage, the water taken from the tank (7) is directed onto the filter (6) and the heat exchanger (4) and the fiber, lint and dust accumulating thereon are enabled to be washed and the water draining therefrom is enabled to be accumulated in the drainage channel (8). In the second stage, the first outlet (14) of the flow control means (16) operated by the control unit (10) is opened and the second outlet (15) is closed, and the discharge pump (8) is operated. The water mixed with fiber, lint and dust delivered into the drainage channel (8) is transferred to the tank (7) by means of the first hose (11). Fiber, lint and dust transferred to the tank (7) together with the water by means of the first hose (11) is held in the tank (7) by the known filtration methods. Afterwards, the discharge pump (9) is stopped and the water in the tank (7) is enabled to flow into the drainage channel (8) from the first hose (11). Since the first hose (11), which has a larger diameter than that of the second hose (12), is used, almost all of the particles such as fiber, lint and dust are transferred to the tank (7) together with the water without causing any clogging. In the third stage, the first outlet (14) of the flow control means (16) is closed and the second outlet (15) thereof is opened. The clean water that has been cleansed of almost all fiber, lint and dust and has returned from the tank (7) to the drainage channel (8) in the second stage is transferred again into the tank (7) by means of the second hose (12) with narrow diameter and the discharge pump (9) is stopped. Since the diameter of the second hose (12) is smaller than that of the first hose (11), with the stopping of the discharge pump (9), the amount of water remaining in the second hose (12) and returning to the drainage channel (8) is enabled to be so small as to be negligible. Thus, in the fiber and lint cleaning method, the outlet of the discharge pump (9) is prevented from clogging and the amount of water returning to the drainage channel (8) is decreased.

[0034] By means of the present invention, with the discharge pump (9), the water containing fiber, lint and dust therein is transferred to the tank (7) without causing any clogging and when the discharge pump (9) is stopped, the

amount of water returning to the drainage channel (8) is minimized.

Claims

1. A laundry dryer (1) comprising a body (2); a drum (3) wherein the laundry to be dried is placed; an air circulation duct (4) providing the delivery of the drying air onto the laundry in the drum (3); a heat exchanger (5) that is disposed on the air circulation duct (4) and that enables the temperature of the drying air to be changed; at least one filter (6) that holds fiber, lint and dust in the drying air; a tank (7) wherein the water condensed in the heat exchanger (5) is stored; a drainage channel (8) wherein the water draining from the heat exchanger (5) and the filter (6) washed with the water taken from the tank (7) and mixed with fiber, lint and dust is collected; a discharge pump (9) that transfers the water accumulated in the drainage channel (8) into the tank (7), and a control unit (10), **characterized in that**
 - a first hose (11) that is disposed between the discharge pump (9) and the tank (7) and that transfers the water mixed with fiber, lint and dust taken from the drainage channel (8) by the discharge pump (9) and a second hose (12) with a smaller diameter than the first hose (11), that is disposed between the discharge pump (9) and the tank (7), and
 - a flow control means (16) that has a water inlet (13) connected to the discharge pump (8), a first outlet (14) connected to the first hose (11) and a second outlet (15) connected to the second hose (12) and that enables the water accumulated in the drainage channel (8) into the tank (7) by means of the first hose (11) and the second hose (12) respectively.
2. A laundry dryer (1) as in Claim 1, **characterized in that** the flow control means (16) comprising a three way valve (17) that is connected to the water inlet (13), the first outlet (14) and the second outlet (15) and that enables the water to be directed to the first hose (11) or to the second hose (12).
3. A laundry dryer (1) as in Claim 1, **characterized in that** the flow control means (16) comprising two two way valves (18) that are connected between the water inlet (13) and the first outlet (14) and between the water inlet (13) and the second outlet (15) and that enable the water to be directed to the first hose (11) or to the second hose (12).
4. A fiber and lint cleaning method executed by the control unit (10) in a laundry dryer (1), comprising the step of:

- washing the filter (6) and the heat exchanger (5) with the water taken from the tank (7) and accumulating the water draining therefrom in the drainage channel (8),
- opening the first outlet (14) of the flow control means (16) and closing the second outlet (15) thereof;
- operating the discharge pump (9);
- transferring the water mixed with fiber, lint and dust in the drainage channel (8) to the tank (7) by means of the first hose (11);
- stopping the discharge pump (9) and delivering the water cleansed from fiber, lint and dust in the tank (7) into the drainage channel (8);
- closing the first outlet (14) of the flow control means (16) and opening the second outlet (15) thereof;
- operating the discharge pump (9);
- transferring the clean water in the drainage channel (8) to the tank (7) by means of the second hose (12) with smaller diameter;
- stopping the discharge pump (9).

Figure 1

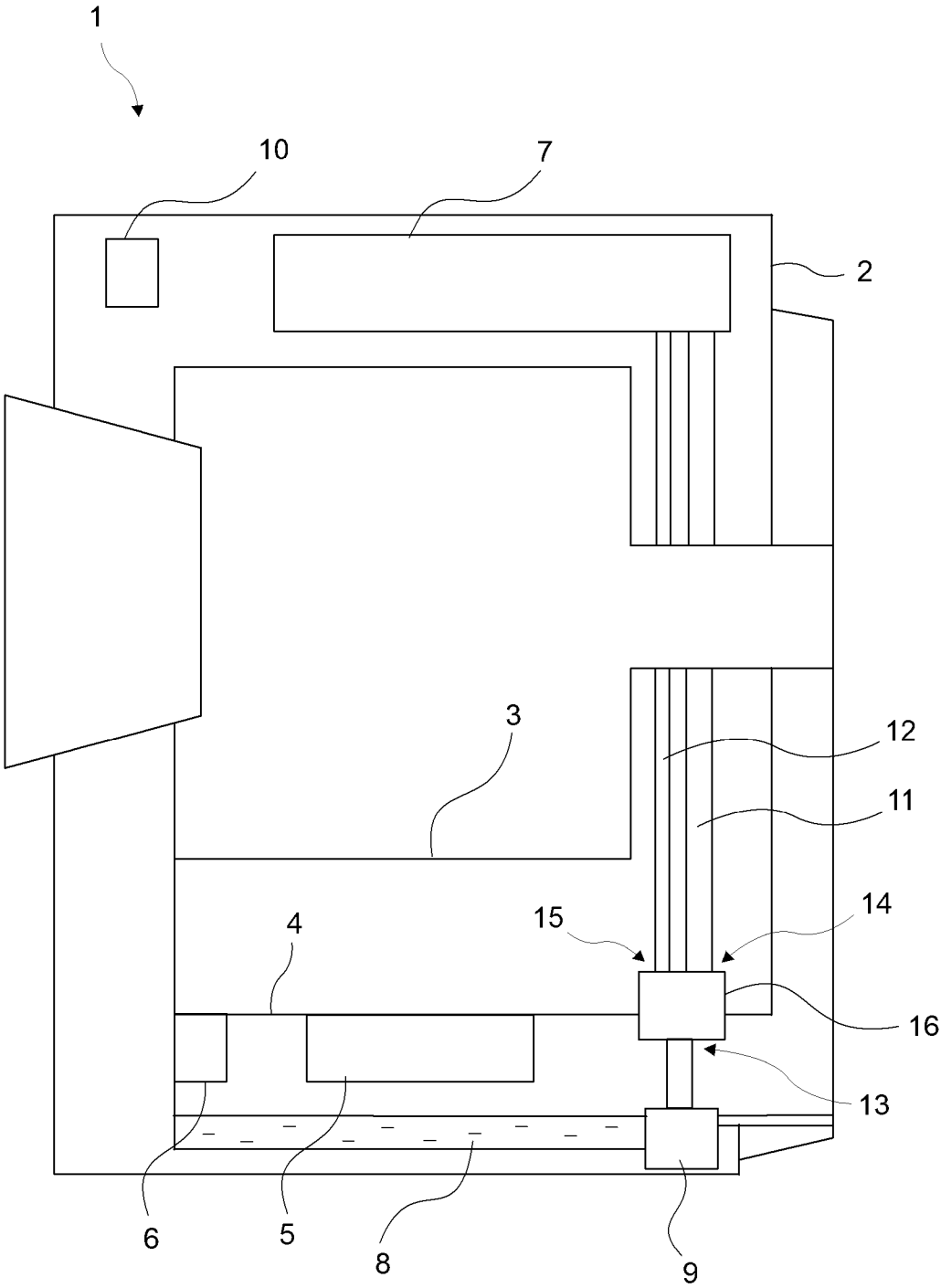


Figure 2

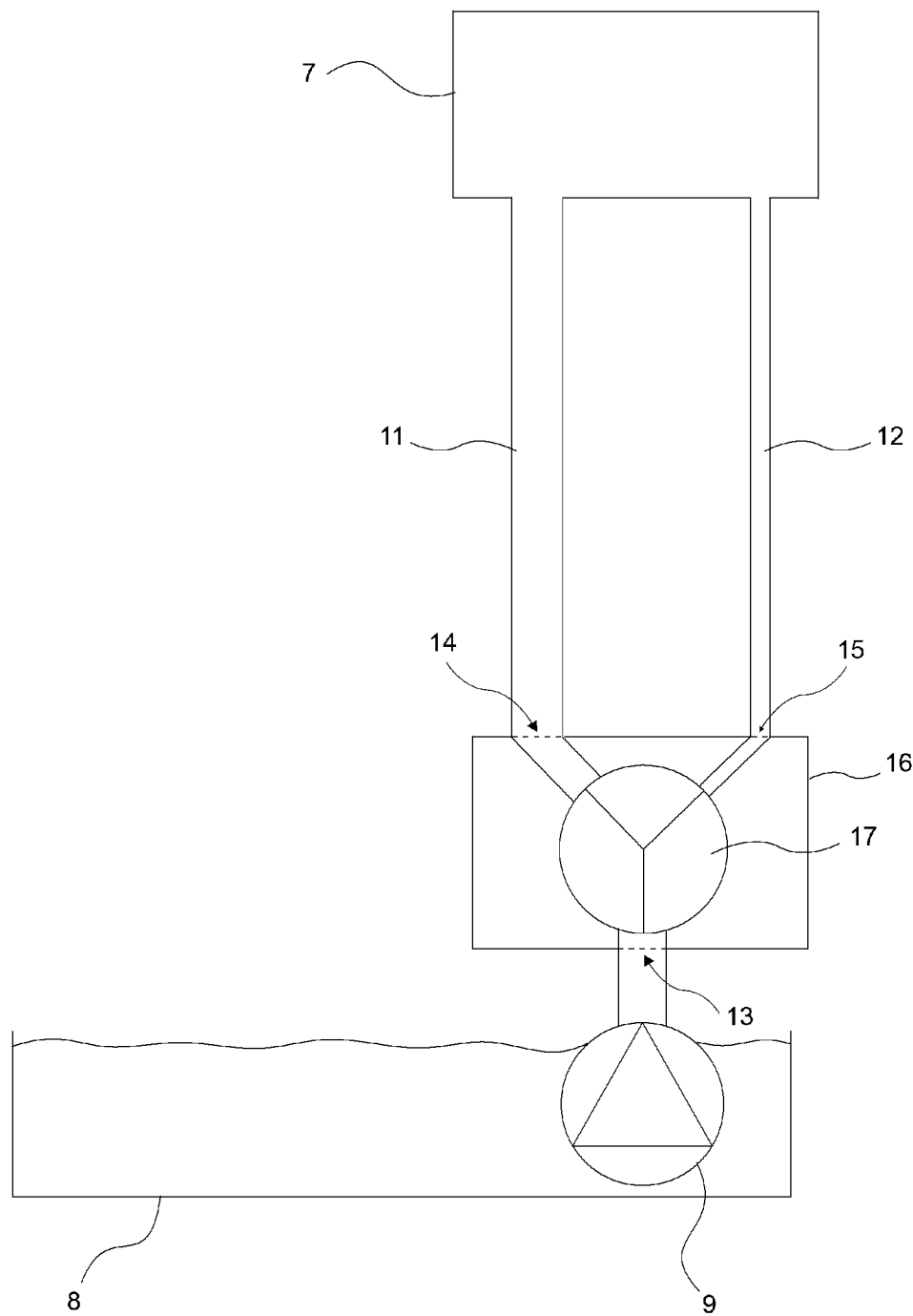
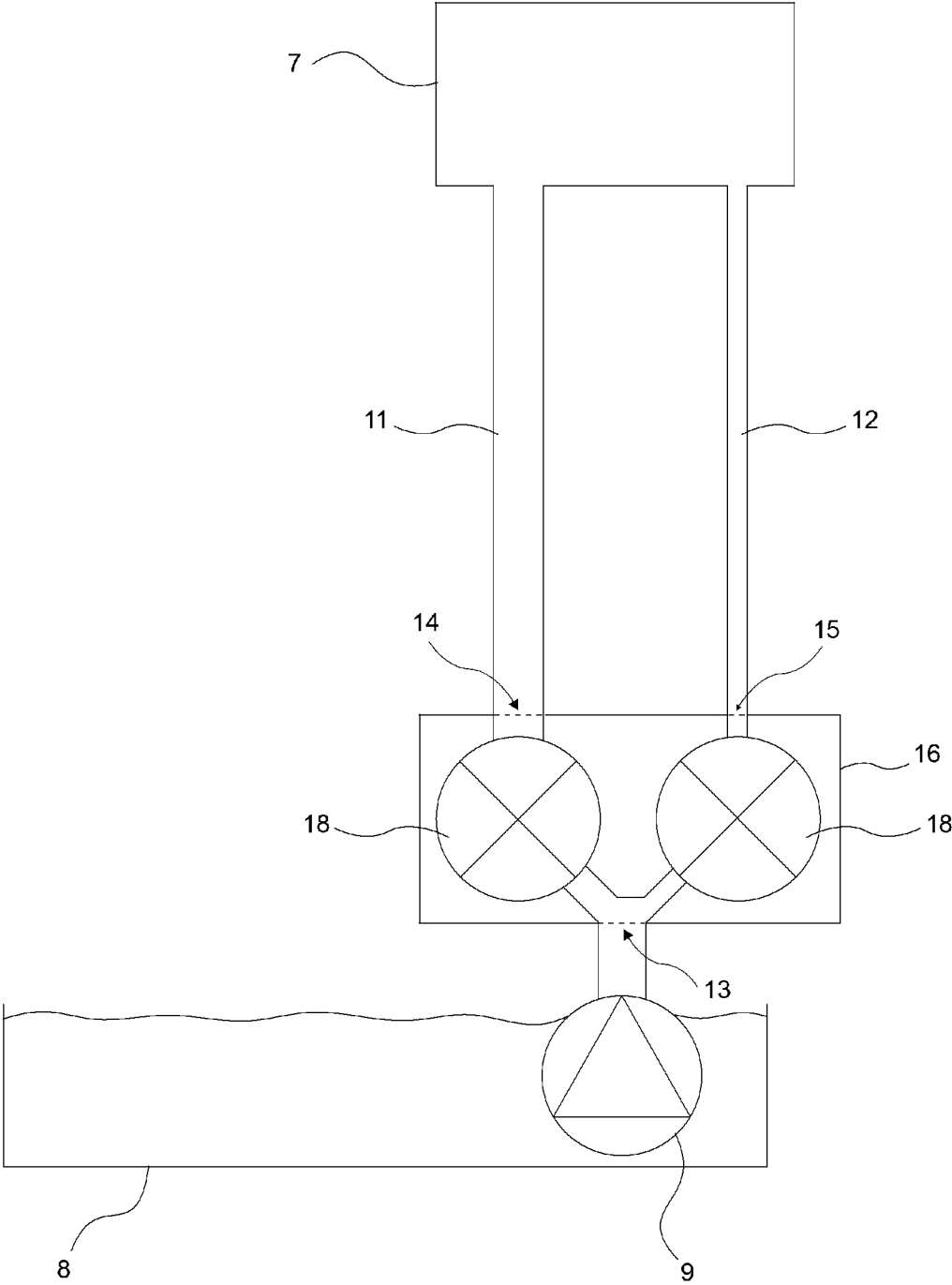


Figure 3



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. D06F58/22 D06F58/24
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2008 054832 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 1 July 2010 (2010-07-01) paragraphs [0036], [0037] figure 2 -----	1-3



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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102008054832 A1	01-07-2010	NONE	