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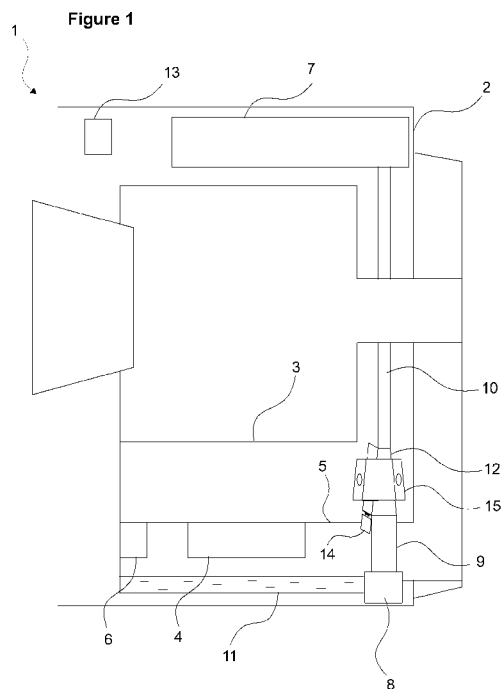
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
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(54) Title: A LAUNDRY DRYER



(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 (5) providing the delivery of the drying air onto the laundry in the drum (3); a heat exchanger (4) that is disposed on the air circulation duct (5) 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 condensed water is stored; a discharge channel (11) wherein the water draining from the components washed with the water taken from the tank (7) and the fiber, lint and dust are collected; a discharge pump (8) that transfers the water and the fiber, lint and dust accumulated in the discharge channel (11) into the tank (7), and a control unit (13).

Description**A LAUNDRY DRYER**

- [0001] The present invention relates to a laundry dryer wherein lint, fluff and dust accumulating on components such as heat exchanger, filter, etc. are 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 these particles 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. In these embodiments, the water received from the tank removes undesired particles on the components being cleaned by it and continues its circulation.
- [0003] 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 containing particles therein is sucked by the discharge pump and pumped into the discharge channel for this process, 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 in order to decrease the amount of water that is emptied back, 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 laundry dryer wherein the water containing particles therein is discharged to the tank so that less water remains in the discharge channel 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 two hoses, one with a large and the other with a small diameter, that are disposed on the same line between the discharge pump and the tank, the outlet of one of the hoses being connected to the inlet of the other. 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 hoses with two different diameters are joined by means of a conical pipe reducer. Thus, the narrowing diameter occurring as a result of joining the first hose and the second hose does not prevent the flow of the water.
- [0009] In another embodiment of the present invention, the length of the first hose is shorter than that of the second hose. Thus, it is provided that less amount of water remains in the second hose when the discharge pump is stopped.
- [0010] In another embodiment of the present invention, a vibration motor is

mounted onto the pipe reducer. By means of the vibration motor operated together with the discharge pump, the pipe reducer is vibrated, thus the fiber, lint and dust passing through the first hose together with the water are prevented from causing a possible clogging at the inlet of the second hose due to the narrowing diameter.

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

[0012] A laundry dryer realized in order to attain the aim of the present invention is 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 vibration motor, the pipe reducer and the fixing element that are disposed in a laundry dryer.

[0015] The elements illustrated in the figures are numbered as follows:

1. Laundry dryer
2. Body
3. Drum
4. Heat exchanger
5. Air circulation duct
6. Filter
7. Tank
8. Discharge pump
9. First hose
10. Second hose
11. Discharge channel
12. Pipe reducer

- 13. Control unit
- 14. Vibration motor
- 15. Fixing element

[0016] 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 (5) providing the delivery of the drying air onto the laundry in the drum (3); a heat exchanger (4), for example an evaporator, that is disposed on the air circulation duct (5) 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 condensed water is stored; a discharge channel (11) wherein the water draining from the filter (6) and the heat exchanger (4) washed with the water taken from the tank (7) and mixed with fiber, lint and dust is collected; a discharge pump (8) that transfers the water accumulated in the discharge channel (11) into the tank (7), and a control unit (13).

[0017] The laundry dryer (1) further comprises a first hose (9) with one end connected to the outlet of the discharge pump (8), the first hose (9) being disposed between the discharge pump (8) and the tank (7) and carrying the water mixed with fiber, lint and dust taken from the discharge channel (11) from the discharge pump (8) into the tank (7), the laundry dryer (1) further comprising a second hose (10) that creates a single flow line by being connected to the first hose (9) end to end, that has a smaller diameter than that of the first hose (9), one of the second hose (10) being connected to the other end of the first hose (9) and the other end being connected to the tank (7).

[0018] In the laundry dryer (1) of the present invention, the discharge pump (8) is controlled by the control unit (13) as follows. The water taken from the tank (7) is directed onto the components. The discharge pump (8) operated by the control unit (13) takes the water draining from the washed filter (6) and heat exchanger (4) and flowing into the discharge channel (11) and mixed with fiber, lint and dust, and in the first cycle transfers the same into the tank (7) by means of the first hose (9) and the second hose (10) connected to the latter. In this case, fiber, lint and dust transferred to the

tank (7) together with the water by means of the first hose (9) and the second hose (10) is held in the tank (7) by the known filtration methods. Since the first hose (9), which has a larger diameter than that of the second hose (10), is connected to the outlet of the discharge pump (8), almost all of the particles such as fiber, lint and dust are enabled to be transferred to the tank (7) together with the water, thus preventing the clogging at the outlet of the discharge pump (8). In the second cycle, the water, which is cleansed of almost all of the particles such as fiber, lint and dust in the first cycle, is transferred again to the tank (7) and the discharge pump (8) is stopped. It is provided that less amount of water remains in the second hose (10) when the discharge pump (8) is stopped. Since the diameter of the second hose (10) is smaller than that of the first hose (9), with the stopping of the discharge pump (8), the amount of water remaining in the second hose (10) and returning to the discharge channel (11) is enabled to be so small as to be negligible. Thus, the amount of water returning to the discharge channel (11) with the stopping of the discharge pump (8) is reduced without causing any clogging in the first and second hoses (9 and 10).

[0019] In an embodiment of the present invention, the laundry dryer (1) comprises a conical pipe reducer (12) that is disposed between the first hose (9) and the second hose (10), that is connected to the outlet of the first hose (9) with one end and to the inlet of the second hose (10) with the other end, thereby joining the first and second hoses (9 and 10) with different diameters.

[0020] By means of the pipe reducer (12), the first and second hoses (9 and 10) are joined so as not to prevent the flow of the water. The wide port of the pipe reducer (12) is connected to the first hose (9) with larger diameter and the narrow port of the former is connected to the second hose (10) with smaller diameter. Thus, the fiber, lint and dust passing through the first hose (9) with larger diameter together with the water is enabled to pass into the second hose (10) with smaller diameter without causing any clogging due to the narrowing diameter, and to be transferred to the tank (7).

- [0021] In another embodiment of the present invention, the length of the first hose (9) is shorter than that of the second hose (10). Thus, it is provided that less amount of water remains in the second hose (10) when the discharge pump (8) is stopped.
- [0022] In another embodiment of the present invention, the laundry dryer (1) comprises a vibration motor (14) that is mounted onto the pipe reducer (12) by means of a fixing element (15). The vibration motor (14) is operated by the control unit (13) simultaneously with the discharge pump (8). By operating the vibration motor (14), the pipe reducer (12) is vibrated, thus the fiber, lint and dust passing through the first hose (9) together with the water are prevented from causing a possible clogging at the inlet of the second hose (10) with a smaller diameter than that of the first hose (9) due to the narrowing diameter (Figure 1 and Figure 2).
- [0023] In an embodiment of the present invention, the fixing element (15) is a clamp, for example a hose clamp in ring form. The fixing element (15) in form of clamp completely surrounds the pipe reducer (12) over the vibration motor (14), thus transmitting the vibrations all around and enabling the entire lateral surface of the pipe reducer (12) to be vibrated.
- [0024] By means of the present invention, with the discharge pump (8), the water containing fiber, lint and dust therein is directed towards the tank (7) without causing any clogging at the outlet of the discharge pump (8) and when the discharge pump (8) is stopped, the amount of water returning to the discharge channel (11) 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 (5) providing the delivery of the drying air onto the laundry in the drum (3); a heat exchanger (4) that is disposed on the air circulation duct (5) 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 condensed water is stored; a discharge channel (11) wherein the water draining from the filter (6) and the heat exchanger (4) washed with the water taken from the tank (7) and mixed with fiber, lint and dust is collected; a discharge pump (8) that transfers the water accumulated in the discharge channel (11) into the tank (7), and a control unit (13) that controls the discharge pump (8), **characterized in that**
 - a first hose (9) with one end connected to the outlet of the discharge pump (8), the first hose (9) being disposed between the discharge pump (8) and the tank (7) and carrying the water mixed with fiber, lint and dust taken from the discharge channel (11) from the discharge pump (8) into the tank (7) and
 - a second hose (10) that creates a single flow line by being connected to the first hose (9) end to end, that has a smaller diameter than that of the first hose (9), one of the second hose (10) being connected to the first hose (9) and the other end being connected to the tank (7).
2. A laundry dryer (1) as in Claim 1, **characterized in that** a conical pipe reducer (12) that is disposed between the first hose (9) and the second hose (10), that is connected to the outlet of the first hose (9) with one end and to the inlet of the second hose (10) with the other end, thereby joining the first and second hoses (9 and 10) with different diameters.
3. A laundry dryer (1) as in Claim 1 or 2, **characterized in that** the first hose (9) that is shorter than the second hose (10).
4. A laundry dryer (1) as in Claim 2, **characterized in that** a vibration motor (14) that is mounted onto the pipe reducer (12) by means of a fixing element (15).
5. A laundry dryer (1) as in Claim 4, **characterized in that** the vibration motor (14) that is controlled by the control unit (13) and that is operated simultaneously with the discharge pump (8).
6. A laundry dryer (1) as in Claim 4, **characterized in that** a clamp-shaped fixing

element (15).

Figure 1

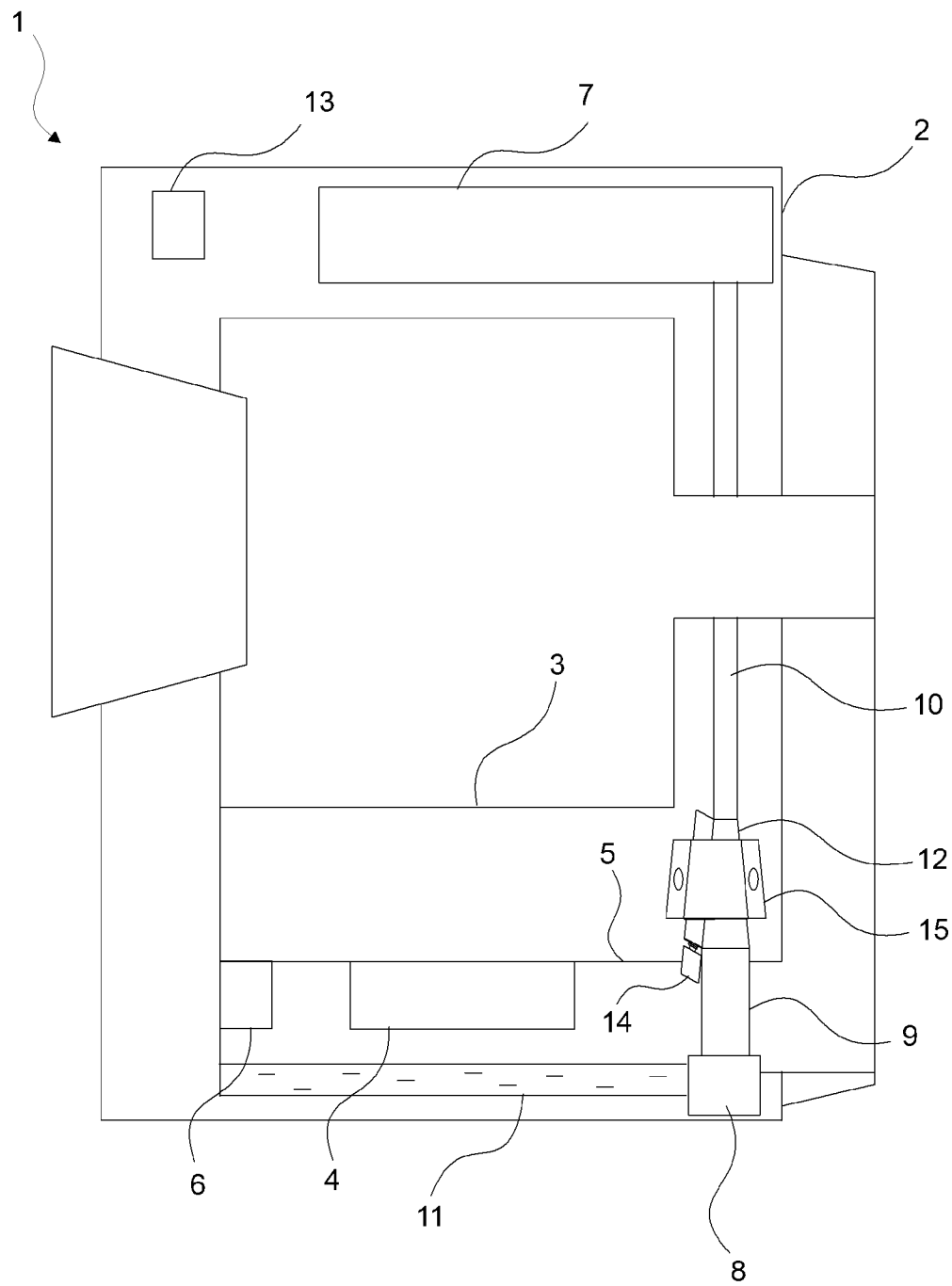
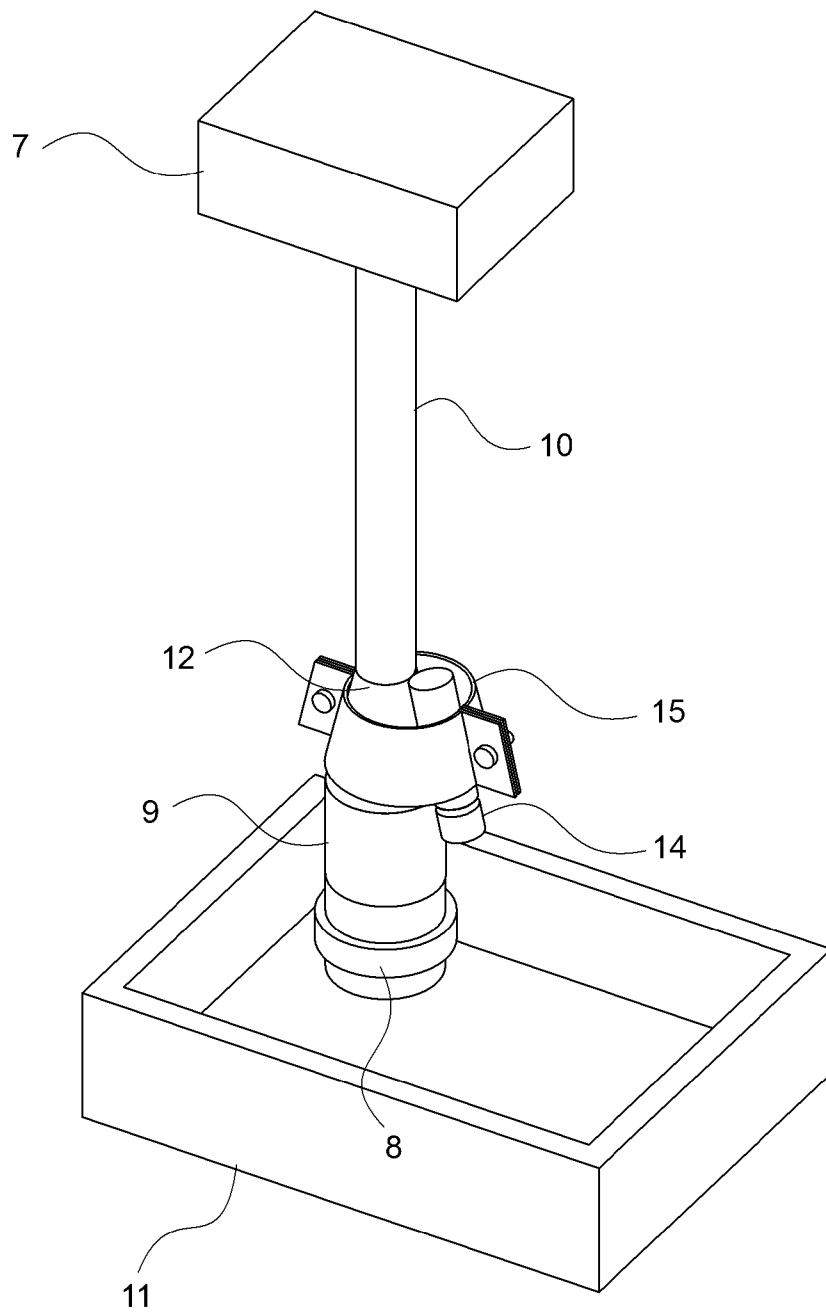


Figure 2

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/056725

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 A	DE 10 2008 054832 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 1 July 2010 (2010-07-01) paragraph [0030] - paragraph [0034] figures 1-3 paragraph [0008] -----	1,3 2,4-6
X A	WO 2011/061068 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; GRUNERT KLAUS [DE]) 26 May 2011 (2011-05-26) figure 6 -----	1,3 2
X	FR 3 011 254 A1 (FAGORBRANDT SAS [FR]) 3 April 2015 (2015-04-03) figure 3 -----	1



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

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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	
WO 2011061068 A1	26-05-2011	DE 102009046921 A1 WO 2011061068 A1	26-05-2011 26-05-2011
FR 3011254 A1	03-04-2015	NONE	