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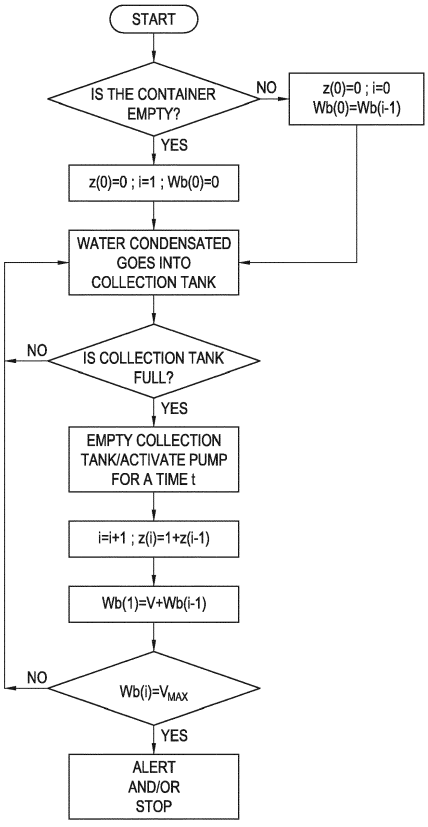
(54) **METHOD FOR DETERMINING THE AMOUNT OF WATER IN A CONTAINER FOR CLOTHES DRYER, PROCESS FOR DRYING CLOTHES IN A CLOTHES DRYER AND CLOTHES DRYER IMPLEMENTING THESE METHOD AND PROCESS**

(57) The present invention is related to a process for drying clothes in a clothes dryer, the clothes dryer (1) comprising: a box-like casing (3) for accommodating laundry to be dried, a device (5, 6) for generating a heated air flow through the box-like casing (3), a collection tank (9) configured to collect condensed water coming from the box-like casing (3), a container (10) in fluid communication with the collection tank (9). The process comprises: starting a drying cycle wherein water from laundry in the box-like casing (3) condenses and is collected in the collection tank (9); checking if a predefined volume of water is reached in the collection tank (9); wherein each time the predefined volume of water is reached in the collection tank (9), "z" pumping cycles (PCi) are performed, wherein each pumping cycle (PCi) conveys a predetermined volume of water (V) from the collection tank (9) to the container (10); determining an amount of water (Wb(i)) in the container (10) by calculating the number "z" of pumping cycles (PCi).

FIG.2



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Description

Field of the art

[0001] The present invention relates to a method for determining the amount of water in a container for clothes dryer. The present invention relates to a process for drying clothes in a clothes dryer. The present invention also relates to a clothes dryer implementing these method and process. In particular, the invention is applicable to the field of condensation-type clothes dryers.

State of the art

[0002] Clothes dryers, in particular of the condensation type, are per se known and typically comprise a drum containing laundry to be dried by an air jet generated by a fan and heated by an electric resistor or by a condenser device in a machine fitted with a heat pump.

[0003] The hot air jet flows through the laundry in the drum, thereby subtracting moisture therefrom, and then flows through a filter that removes any lint and other impurities from the air jet.

[0004] Said air jet also flows through a heat exchanger, where it cools down through the effect of thermal exchange with colder environmental air, thus condensing and yielding water, which flows into a collection tank usually located in the lower part of the machine. From the collection tank, the water is conveyed by a pump into a removable container typically arranged in the upper part of the machine, in a position easily accessible to a user, who can then periodically remove and empty said container.

[0005] Document EP2455539, in the name of the same applicant, discloses a clothes dryer of the kind above described.

[0006] Document US8683713 discloses a dryer including a condensing unit to change water vapor evaporated from a drying object into condensate water by cooling, a condensate water storage container in which the condensate water is stored, a water level sensing device to detect a level of the stored condensate water, and a microcomputer to calculate a change rate of condensation or of the condensate water level based on the detected water level and to determine a value of dryness of the drying object.

[0007] Document US7448146 discloses a cyclone condensing apparatus having a structure in which air of high-temperature and high-humidity contacts cooling water, and condensed water is discharged to the outside, and a washing/drying machine having the cyclone condensing apparatus. The cyclone condensing apparatus includes an air inlet connected to the upper part of a casing, an air outlet disposed along the central line of the casing and a plurality of cooling water spray nozzles disposed along the circumferential direction of the casing. A water-collecting container for collecting the condensed water is connected to the lower end of the casing. The cyclone condensing apparatus further includes an air blast fan and a heater in the washing/drying machine and is connected to an air circulating duct forming a closed circuit together with a dry tub, thereby condensing water from air of high-temperature and high-humidity passed through the dry tub

Object of the invention

[0008] The Applicant observed that the known condensed water containers suffer from some drawbacks.

[0009] Indeed, a system must be present to stop the pump in order to avoid the water to overflow from the removable container.

[0010] Known systems comprise level sensors which render the structure of the container bulky and complex, in particular since the container must be removed and emptied each time it is full of water. Furthermore, sensors may be subject to failures and malfunctions.

[0011] It is the main object of the present invention to overcome the above-mentioned drawbacks by providing a reliable method for determining the amount of water in the container.

[0012] Another object of the present invention is to provide a method for determining the amount of water in the container, wherein said method allows to simplify the structure of the container and of the housing in which said container is placed. Another object of the present invention is to provide a clothes dryer which is structurally simple, so as to increase safety and reliability and decrease the production costs.

Summary of the invention

[0013] The Applicant has found that such objectives can be obtained by controlling the amount of water flowing from the collection tank into the container and determining the amount of water in the container through such control. In particular, the number of times a condensate pump is activated to deliver condensate from a collection tank up to the removable container is determined, where the number of activations of the condensate pump indicates the amount of water in the container and, possibly, if such container is full and needs to be removed and emptied. More specifically, according to one aspect, the present invention relates to a method for determining the amount of water in a container for clothes dryer, said clothes dryer comprising: a collection tank configured to collect condensed water coming from a box-like casing accommodating laundry to be dried, a container in fluid communication with the collection tank. The method comprising: performing "z" pumping cycles, wherein each pumping cycle conveys a predetermined volume of water from the collection tank to the container; determining an amount of water in the container by calculating the number "z" of pumping cycles.

[0014] According to an aspect, the present invention relates to a process for drying clothes in a clothes dryer

comprising such method.

[0015] According to an aspect, the present invention relates to a process for drying clothes in a clothes dryer, said clothes dryer comprising: a box-like casing for accommodating laundry to be dried, a device for generating a heated air flow through the box-like casing, a collection tank configured to collect condensed water coming from the box-like casing, a container in fluid communication with the collection tank. The process comprising: starting a drying cycle wherein water from laundry in the box-like casing condenses and is collected in the collection tank; checking if a predefined volume of water is reached in the collection tank; wherein each time said predefined volume of water is reached in the collection tank, "z" pumping cycles are performed, wherein each pumping cycle conveys a predetermined volume of water from the collection tank to the container; determining an amount of water in the container by calculating the number "z" of pumping cycles.

[0016] According to another aspect, the present invention relates to a clothes dryer, in particular of the condensation type, implementing the above method and process. According to another aspect, the present invention relates to a clothes dryer, in particular of the condensation type, comprising: a frame; a box-like casing for accommodating laundry to be dried, the box-like casing being located inside the frame; means for generating a heated air flow through the box-like casing; a collection tank, optionally arranged in a lower part of the frame, configured to collect condensed water; a container, optionally arranged in an upper part of the frame and optionally removably associated with frame; a pump in fluid communication with the collection tank and with the container and configured to convey the collected water from the collection tank to the container; a control unit operatively connected at least to the pump. The control unit is configured to execute the following procedure: activating the pump to perform "z" pumping cycles, wherein each pumping cycle conveys a predetermined volume of water from the collection tank to the container;
determining an amount of water in the container by calculating the number "z" of pumping cycles.

[0017] The Applicant verified that the invention allows to measure and monitor the volume of condensed water in the container in a reliable and accurate way. The invention allows to avoid sensors to be placed necessarily (even if they may be present) in or close to the container to detect the level of water.

[0018] The present invention, in at least one of the aforesaid aspects, can have one or more of the preferred characteristics that are described hereinbelow.

[0019] Preferably, the capacity of the container is greater than the capacity of the collection tank, preferably five to ten times greater.

[0020] Preferably, the clothes dryer comprises a sensor connected to the control unit and operatively connected to collection tank to detect a volume of water in the collection tank and/or a level of water in the collection tank and/or if the collection tank is full of water.

[0021] Preferably, the sensor is an overflow sensor configured to detect overflow of the collection tank.

[0022] Preferably, the dryer comprises an overflow conduit departing from an upper portion of the container and ending above the collection tank, wherein in case of overflow in the container, water flows back through the overflow conduit in the collection tank.

[0023] Preferably, in case of failure of the control unit and of the calculation of the amount of water in the container, the overflow of water from the container causes raising of water level in the collection tank which is sensed by the overflow sensor that triggers an alarm and/or stop the drying cycle.

[0024] Preferably, the control unit is configured to control the pump to perform the "z" pumping cycles.

[0025] Preferably, the pump performs the "z" pumping cycles each time a predefined volume of water is reached in the collection tank.

[0026] Preferably, the pump performs the "z" pumping cycles each time a predefined high level of water is reached in the collection tank.

[0027] Preferably, the pump performs the "z" pumping cycles each time the collection tank is full of water.

[0028] Preferably, performing the "z" pumping cycles empties the collection tank.

[0029] In other words, the "z" pumping cycles may be performed each time a predefined volume of water is reached in the collection tank, wherein said predefined volume of water may be or not the maximum quantity of water that the collection tank is able to contain, wherein by means of said "z" pumping cycles the collection tank may be wholly emptied or not.

[0030] Preferably, the pump performs the "z" pumping cycles each time a predefined volume of water is present in the container.

[0031] Preferably, the pump performs the "z" pumping cycles each time a predefined low level of water is detected in the container.

[0032] Preferably, the pump performs the "z" pumping cycles each time the container is empty.

[0033] In other words, the "z" pumping cycles may be performed each time a predefined low volume of water is present in the container, wherein said predefined volume of water may be or not zero.

[0034] Preferably, a level sensor is connected to the control unit and it is operatively associated to the container to detect the volume and/or the level of water in the container and/or if the container is empty.

[0035] Preferably, the amount of water in the container is shown on a display.

[0036] Preferably, the amount of water in the container is shown on a display during the drying cycle and/or at the end of the drying cycle.

[0037] Preferably, the amount of water in the container is continuously updated on the display.

[0038] Preferably, an alert signal is generated when the container is full.

[0039] Preferably, the drying cycle is stopped when the container is full.

[0040] Preferably, provision is made for comparing the amount of water in the container with a maximum value and sending an alert signal and/or stopping the drying cycle if the amount of water reaches the maximum value during the drying cycle. Preferably, provision is made for memorizing the amount of water in the container at the end of the drying cycle.

[0041] Preferably, provision is made for comparing said amount of water with a maximum value.

[0042] Preferably, provision is made for calculating a residual free volume of the container. Preferably, provision is made for estimating the total amount of condensed water of a following selected drying cycle.

[0043] Preferably, provision is made for sending an alert signal and/or preventing the implementation of the following selected drying cycle if the estimated total amount of condensed water is greater than the residual free volume.

Brief description of the drawings

[0044] Further objects, features and advantages of the present invention will become apparent from the following detailed description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

Fig. 1 schematically shows a clothes dryer according to the present invention;
Fig. 2 is a flowchart of a process according to the present invention.

Detailed description of the preferred embodiments of the invention

[0045] Referring now to the annexed drawings, in Fig. 1 reference numeral 1 designates as a whole a clothes dryer, in particular of the condensation type, according to the present invention.

[0046] The clothes dryer 1 comprises a frame 2 that houses a box like casing 3 shaped like a drum and adapted to contain laundry (not shown) to be dried, said drum 3 being accessible from the outside through a door 4 usually fitted with sealing gaskets (not shown).

[0047] In addition, the clothes dryer 1 comprises first means 5, 6 for blowing heated air into said drum 3, said first means comprising in particular an electric resistor 5 and a fan 6. As an alternative (not shown in the annexed drawings), in a clothes dryer equipped with a heat pump said first means may comprise a condenser device and a fan.

[0048] The clothes dryer 1 further comprises second means 7 for exchanging heat, said second means 7 being crossed by the air coming from the drum 3. Preferably, said second means comprise an exchanger 7, where the humid air coming from the drum 3 condenses.

[0049] The clothes dryer 1 also comprises at least one container 10 for collecting the condensed water produced by said second means 7 for exchanging heat.

[0050] In particular, the humid air exiting the drum 3 flows through a filter 8 for removing any lint and/or other impurities from the air jet; in said second means 7 the hot humid air is then cooled through thermal exchange with fresh air (normally at ambient temperature) conveyed by a second fan 7A.

[0051] The condensed water is collected in a collection tank 9 present at a lower part of the frame and it is delivered, by a pump 9A, towards the container 10. The capacity of the container 10 is about ten times greater than a capacity of the collection tank 9.

[0052] As shown in Fig.1, a conduit 9B connects the lower collection tank 9 to the upper container 10 and the pump 9A is operatively disposed on said conduit 9B. An auxiliary conduit 9C, or overflow conduit, departs from an upper portion of the container 10 and ends above the collection tank 9.

[0053] The one described above is a basic scheme of a clothes dryer, in particular of the condensation type, which is useful for understanding the operation thereof; in practice, however, the machine 1 may include additional components which have been omitted in the present description for simplicity.

[0054] The container 10 is removably associated with a housing "A" in the frame 2 of the clothes dryer 1 and it can be removed for emptying.

[0055] The container 10 of the machine 1 shown in Fig. 1 is arranged in an upper part of the frame 2. This improves the ergonomics of the machine 1, in that said container 10 can be easily reached by a user.

[0056] A first sensor 11, which is schematically represented in Fig.1, is placed in the collection tank 9 and it is configured to sense an upper level of water in said collection tank 9.

[0057] A second sensor 12, which is schematically represented in Fig.1, is placed in the container 10 and it is configured to sense a lower level of water in said container 10.

[0058] A control unit 13, schematically represented in Fig.1, is connected to the pump 9A, to the first sensor 11, to the second sensor 12. The control unit 13 may also be connected to other part of the dryer 1 to control all the operations of the dryer 1.

[0059] According to the process and method of the invention, the control unit 13 is configured to control the operations of the dryer 1 as shown, by example, in the flowchart of Fig. 2.

[0060] After loading the drum 3 with clothes, operation of drying is started. By means of the second sensor 12 the control unit 13 checks if the container 10 is empty. If the container 10 is empty, the volume of water in the container 10 is set to zero (Wb(0)=0). If the container 10 is not empty, the volume of water in the container 10 is set equal to the volume of water of the preceding drying cycle (Wb(0)=i-1) which was saved in a memory of the

control unit 13. In both cases, the pump is not activated (z(0)=0).

[0061] Meanwhile, the condensed water starts filling the collection tank 9.

[0062] By means of the first sensor 11 the control unit 13 checks cyclically if the collection tank 9 is full of water. If the collection tank 9 is not full, the pump 9A is not started and the condensed water keeps on filling the collection tank 9. When the collection tank 9 is full, the control unit 13 activates the pump 9A for a first pumping cycle "PC1 ". During said first pumping cycle "PC1 ", (for a given time "t" and with a given flowrate "Q"), the collection tank 9 is emptied and a predetermined volume of water "V" is conveyed into the container 10.

[0063] The volume of water in the container 10 at the instant i=1 is set to ΔV (Wb(1)= V). The pump 9A is stopped while the drying cycle proceeds and the condensed water keeps on filling the collection tank 9.

[0064] When the collection tank 9 is full again, the control unit 13 activates the pump 9A for a second pumping cycle "PC2". During said second pumping cycle "PC2", (for a given time "t" and with a given flowrate "Q"), the collection tank 9 is emptied again and the predetermined volume of water "V" is conveyed into the container 10.

[0065] The volume of water in the container 10 at the instant i=2 is set to 2V (Wb(2)= 2V). The control unit 13 knows the number of pumping cycle "z", knows the value of predetermined volume of water "V" and calculates the amount of water in the container 10 (Wb(i) = V + Wb(i-1)). The control unit 13 may provide on a display of the dryer 1 the amount of water in the container 10 during the drying cycle.

[0066] Since also the capacity (maximum volume "Vmax" of water) of the container 10 is stored in the memory of the control unit 13, the control unit 13 generates an alert and stops the drying cycle if or when the container 10 is full. The user may then extract the container 10 from the frame 2 and empty the same.

[0067] If at the end of the drying cycle the container 10 is still not full, the control unit 10 stores the amount of water in the container 10 to take it into account in the following drying cycle.

[0068] In particular, said amount of water is compared with the capacity of the container 10 or with a with maximum volume "Vmax" of water and a residual free volume of the container 10 is calculated. Further, the total amount of condensed water of the following selected drying cycle is estimated on the base of the kind of drying cycle selected by the user (synthetic fabric, cotton fabric, etc.). An alert signal is sent and/or start of the following selected drying cycle is prevented if the estimated total amount of condensed water is greater than the residual free volume.

[0069] In other words, where certain fabrics, such as synthetics, are being dried within the dryer 1, lesser amounts of water will be precipitated into the collection tank 9 such that the container 10 will typically be minimally filled after a drying cycle. In such a condition, multiple drying cycles of synthetic fabrics can be operated before the pump 9A is operated enough times to fill the container 10. Conversely, where more absorbent fabrics, such as cotton, are dried, the pump 9A may operate several times over the course of a single drying cycle of dryer 1 such that the container 10 is filled after completion of a single drying cycle of the dryer 1. Once the container 1 is filled to a predetermined level, the control unit 13 send the alert. The dryer 1 will then either shut down or be incapable of activation until such time as the container 10 is emptied. Once the container 10 is empty, the count of activations of the pump 9A begins again to estimate the amount of water within the container 10.

[0070] The first sensor 11 may also be used as an overflow sensor. In case of failure of the control unit 13 and of the calculation of the amount of water in the container 10 according to the present invention, the water overflowing from the container 10 is collected by the overflow conduit 9c and pours into the collection tank 9. Water level in the collection tank 9 raises. The first/overflow sensor 11 detects the level and sends a signal to the control unit 13. The control unit 13 receives such signal, senses that the pump cannot be activated and triggers an alarm and/or stops the drying cycle.

[0071] In a different embodiment, the control unit 13 still calculates and provides on the display the amount of water in the container 10 but, differently from the previous embodiment, when the container is full the alert signal is ruled by the overflow sensor. When the container 10 is full, the water flows through the overflow conduit 9c and pours into the collection tank 9.

[0072] The control unit 13 receives the signal form the overflow sensor and generates the alert signal (and/or stops the drying cycle) only if, after activation of the pump 9A, the container 10 is not empty. If, after activation of the pump 9A, the container 10 is empty, no alert signal is generated and/or the drying cycle is not stopped.

[0073] The clothes dryer equipped therewith described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea. It is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0074] It can therefore be easily understood that the present invention is not limited to the above-described method, process and clothes dryer, but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the inventive idea, as clearly specified in the following claims.

Claims

1. Method for determining the amount of water in a container for clothes dryer, said clothes dryer (1) comprising: a collection tank (9) configured to collect condensed water coming from a box-like casing (3) ac-

commodating laundry to be dried, a container (10) in fluid communication with the collection tank (9); the method comprising:

performing "z" pumping cycles (PCi), wherein each pumping cycle (PCi) conveys a predetermined volume of water (V) from the collection tank (9) to the container (10);
determining an amount of water (Wb(i)) in the container (10) by calculating the number "z" of pumping cycles (PCi).

2. The method of claim 1, wherein the pump (9A) performs the "z" pumping cycles (PCi) each time a predefined volume of water (V) is reached in the collection tank (10).

3. The method of claim 1, wherein the pump (9A) performs the "z" pumping cycles (PCi) each time a predefined high level of water is reached in the collection tank (9).

4. The method of any of the preceding claims, wherein the pump (9A) performs the "z" pumping cycles (PCi) each time the collection tank (9) is full of water.

5. The method of any of any of the preceding claims, wherein performing the "z" pumping cycles (PCi) empties the collection tank (9).

6. The method of any of any of the preceding claims, comprising: showing on a display the amount of water (Wb(i)) in the container (10).

7. The method of any of any of the preceding claims, comprising: sending a warning signal if the amount of water (Wb(i) in the container (10) reaches a maximum value (Vmax).

8. A process for drying clothes in a clothes dryer, said clothes dryer (1) comprising: a box-like casing (3) for accommodating laundry to be dried, a device (5, 6) for generating a heated air flow through the box-like casing (3), a collection tank (9) configured to collect condensed water coming from the box-like casing (3), a container (10) in fluid communication with the collection tank (9); the process comprising:

starting a drying cycle wherein water from laundry in the box-like casing (3) condenses and is collected in the collection tank (9);
checking if a predefined volume of water is reached in the collection tank (9); wherein each time said predefined volume of water is reached in the collection tank (9), "z" pumping cycles (PCi) are performed, wherein each pumping cycle (PCi) conveys a predetermined volume of water (V) from the collection tank (9) to the container (10);
determining an amount of water (Wb(i)) in the container (10) by calculating the number "z" of pumping cycles (PCi).

9. The process of claim 8, comprising: showing on display and during the drying cycle the amount of water (Wb(i)) in the container (10).

10. The process of claim 8 or 9, comprising: comparing the amount of water (Wb(i)) in the container (10) with a maximum value (Vmax) and sending an alert signal and/or stopping the drying cycle if the amount of water (Wb(i)) reaches the maximum value (Vmax) during the drying cycle.

11. The process of any of the preceding claims 8 to 10, comprising: memorizing the amount of water (Wb(i)) in the container (10) at the end of the drying cycle; comparing said amount of water (Wb(i)) with a maximum value (Vmax); calculating a residual free volume of the container (10); estimating the total amount of condensed water of a following selected drying cycle; sending an alert signal and/or preventing the implementation of the following selected drying cycle if the estimated total amount of condensed water is greater than the residual free volume.

12. A clothes dryer (1), in particular of the condensation type, comprising:

a frame (2);
a box-like casing (3) for accommodating laundry to be dried, the box-like casing (3) being located inside the frame (2);
means (5, 6) for generating a heated air flow through the box-like casing (3);
a collection tank (9), optionally arranged in a lower part of the frame (2),
configured to collect condensed water;
a container (10), optionally arranged in an upper part of the frame (2) and
optionally removably associated with frame (2);
a pump (9A) in fluid communication with the collection tank (9) and with the container (10) and configured to convey the collected water from the collection tank (9) to the container (10);
a control unit (13) operatively connected at least to the pump (9A);
wherein the control unit (13) is configured to execute the following procedure:

activating the pump (9A) to perform "z" pumping cycles (PCi), wherein each pumping cycle (PCi) conveys a predetermined volume of water (V) from the collection tank (9) to the container (10);
determining an amount of water (Wb(i)) in

the container (10) by calculating the number "z" of pumping cycles (PCi).

13. The clothes dryer of the preceding claim, comprising a sensor (11) connected to the control unit (13) and operatively connected to collection tank (9) to detect if the collection tank (9) is full of water; wherein the control unit (13) is configured to control the pump (9A) to perform the "z" pumping cycles (PCi) each time the collection tank (9) is full of water.

14. The clothes dryer of any of the preceding claims 12 or 13, further comprising a level sensor (12) connected to the control unit (13) and operatively associated to the container (10) to detect if the container (10) is empty.

15. The clothes dryer of any of the preceding claims 12 or 13, the sensor (11) is an overflow sensor.

FIG.1

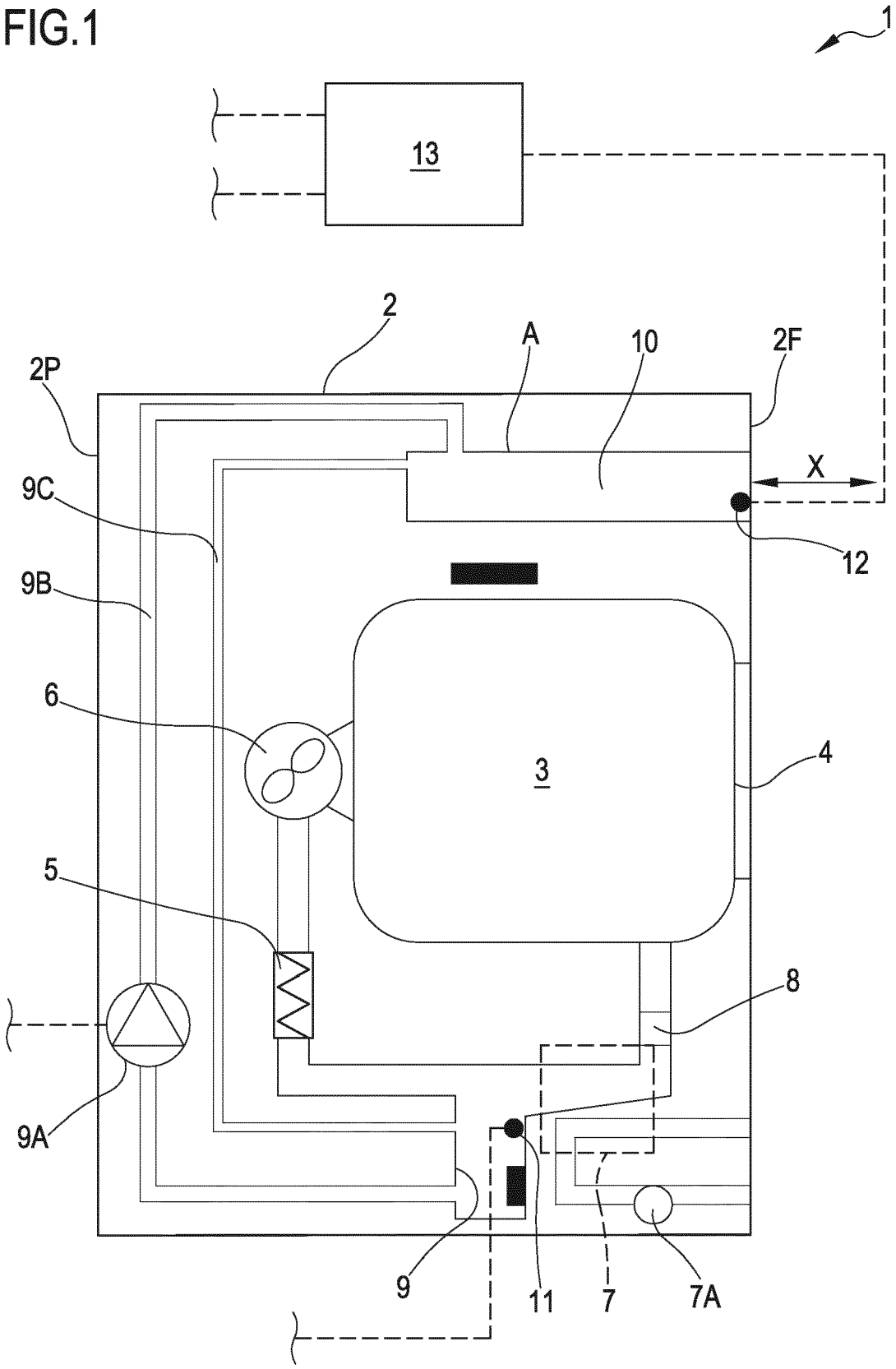
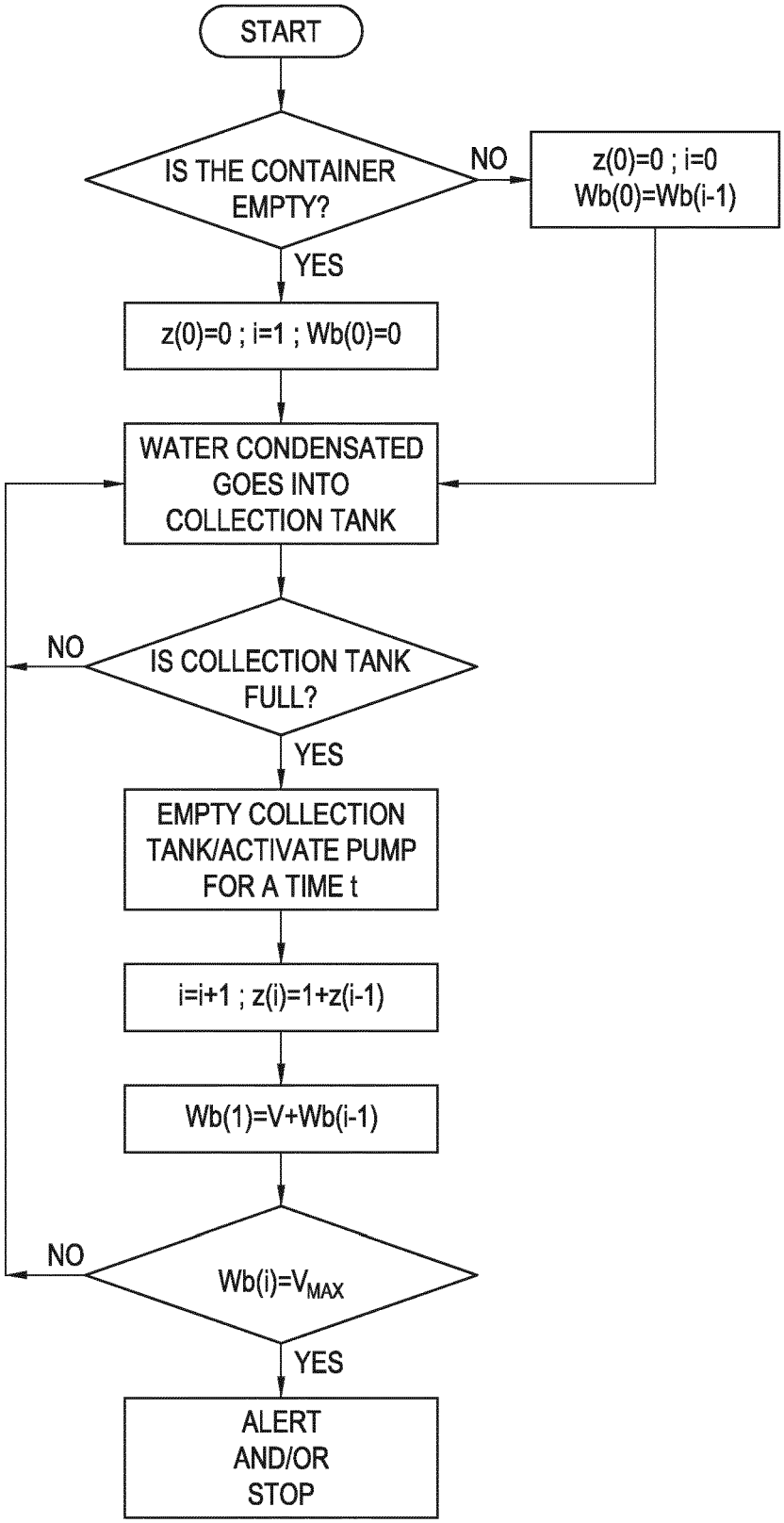


FIG.2


START
IS THE CONTAINER EMPTY?
NO
z(0)=0 ; i=0
Wb(0)=Wb(i-1)
YES
z(0)=0 ; i=1 ; Wb(0)=0
WATER CONDENSATED GOES INTO COLLECTION TANK
NO
IS COLLECTION TANK FULL?
YES
EMPTY COLLECTION TANK/ACTIVATE PUMP FOR A TIME t
i=i+1 ; z(i)=1+z(i-1)
Wb(1)=V+Wb(i-1)
NO
Wb(i)=V_MAX
YES
ALERT AND/OR STOP

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EUROPEAN SEARCH REPORT

Application Number
EP 16 19 2059

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	WO 2009/106926 A1 (INDESIT CO SPA [IT]; MARIOTTI COSTANTINO [IT]; MENCARINI ADRIANO [IT];) 3 September 2009 (2009-09-03) * abstract * * page 3, line 14 - page 6, line 18; figures *	1-5,7,8, 10,12, 13,15 6,9,11, 14	INV. D06F58/24 D06F58/28
Y	EP 1 659 207 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 24 May 2006 (2006-05-24) * abstract; figures *	6,9	
Y	DE 22 32 911 B1 (LICENTIA PATENT-VERWALTUNGS-GMBH) 27 September 1973 (1973-09-27) * the whole document *	11,14	
A	EP 2 808 548 A1 (ASKOLL HOLDING S R L A SOCIO UNICO [IT]) 3 December 2014 (2014-12-03) * abstract * * paragraphs [0052] - [0098]; figures 1-3 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) D06F
A	DE 31 31 543 A1 (BAUKNECHT GMBH G [DE]) 24 February 1983 (1983-02-24) * abstract * * page 7, last paragraph - page 8, line 28; figures *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 January 2017	Prosig, Christina

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 19 2059

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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