(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 872 250 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.09.2021 Bulletin 2021/35

(21) Application number: **21154001.8**

(22) Date of filing: **28.01.2021**

(51) Int Cl.:
D06F 33/68 *(2020.01)* ***D06F 34/18*** *(2020.01)*
D06F 103/04 *(2020.01)* *D06F 105/58* *(2020.01)*
D06F 25/00 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **25.02.2020 EP 20382132**

(71) Applicant: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventors:
- **Caparrós Ezpeleta, Miguel Javier**
  50008 Zaragoza (ES)
- **Garcia Jimenez, Jose Ramon**
  50009 Zaragoza (ES)

(54) **WASHER-DRYER COMPRISING A WEIGHING DEVICE, AND METHOD FOR OPERATING SUCH WASHER-DRYER**

(57) The invention relates to a washer-dryer 1 comprising a drum 3 for receiving laundry 6 to be treated, the drum 3 disposed in a tub 2 and rotatable about an axis 4 and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device 7 for controlling operation of the washer-dryer 1, the control device 7 including a weighing device 8 for determining a load of laundry 6 present in the drum 3, a display device 9 for displaying information to a user, and a setting device 10 for receiving input settings from the user, characterized in that the control device 7 is configured for, upon receiving the laundry 6 into the drum 3 and receiving an input by the setting device 10 for starting treatment of the laundry 6 by washing and drying, weighing the laundry 6 and determining a load of the laundry 6 by the weighing device 8, comparing the load to the second load, and if the load does not exceed the second load, controlling the display device 9 for displaying a first indication that treatment by washing and drying the laundry 6 in the drum 3 may be performed in a continuous process, and if the load exceeds the second load, controlling the display device 9 for displaying a second indication that the treatment by washing and drying the laundry 6 will be interrupted after washing, and the user prompted to remove laundry with a load in excess of the second load from the drum 3 prior to starting drying the laundry 6. The invention also relates to a method of operating such washer-dryer 1.

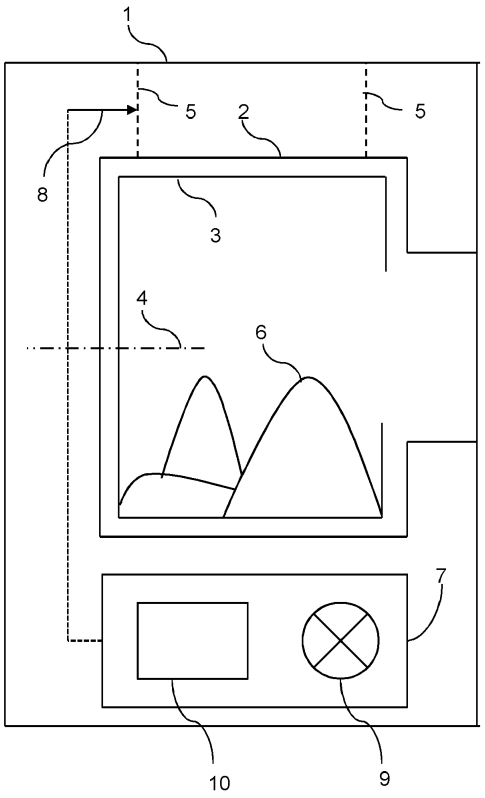

Fig. 1

EP 3 872 250 A1

Description

[0001] The invention relates to a washer-dryer comprising a drum for receiving laundry to be treated, the drum disposed in a tub and rotatable about an axis and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device for controlling operation of the washer-dryer, the control device including a weighing device for determining a load of laundry present in the drum, a display device for displaying information to a user, and a setting device for receiving input settings from the user.

[0002] The invention also relates to a method of operating a washer-dryer comprising a drum for receiving laundry to be treated, the drum disposed in a tub and rotatable about an axis and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device for controlling operation of the washer-dryer, the control device including a weighing device for determining a load of laundry present in the drum, a display device for displaying information to a user, and a setting device for receiving input settings from the user.

[0003] Document WO 2010/018201 A1 discloses a washer-dryer and a method as defined above.

[0004] It is noted that a conventional washer-dryer is generally not able to dry a full load of laundry that it is able to wash. For these reasons it is conventional to have a washer-dryer stop operation after completing a washing process, have the user remove a part of the wet laundry, and re-start the washer-dryer for drying the remaining laundry first, remove the dried remainder from the washer-dryer and re-insert the previously removed still wet laundry and have it dried subsequently. This procedure is time-consuming and cumbersome for the user, requiring attention to the washer-dryer two times after starting a process for drying laundry.

[0005] In current development a device applicable for weighing laundry has been incorporated into a washer-dryer, specifically for controlling balance in spinning operation of the washer-dryer for de-watering laundry after washing and avoiding excess unbalance. Also methods for determining amounts of laundry present in a washing machine or washer-dryer have been established which assess an amount of laundry present by evaluating its soaking properties when liquid is added to the laundry.

[0006] WO 2010/018201 A1 in particular relates to a drum-type washing machine that may be embodied as a washer-dryer, and to a method for controlling a water inflow thereof. The washing machine includes a control device for controlling operations, a detecting unit for detecting a load of laundry, a timing unit for recording operating times of the washing machine, a comparing unit for performing comparisons between operating parameters , and a water supply for unit for feeding a washing solution of water and additives like detergents into the washing machine.

[0007] EP 3 109 356 A1 relates to a drying method for implementation in a washer-dryer. The washer-dryer comprises: a tub, a drum arranged within the tub and adapted to receive laundry for treatment within the drum, a washing arrangement adapted to wash the laundry received in the drum, a drying arrangement comprising a drying air heater and a drying air fan for drying the laundry, and a load detector for detecting a load signal indicative of the load received in the drum. The washer-dryer is adapted to dry the laundry received in the drum and the drying method comprises evaluation of a moment of inertia of laundry being dried and being rotated in the drum, and executing a dewatering spin cycle if the moment of inertia is found to exceed a predetermined threshold.

[0008] Accordingly it is a problem to improve operation of a washer-dryer by providing guidance to a user with respect to handling loads of laundry for washing and drying by the washer-dryer, and minimize necessary interaction between the user and the washer-dryer when treating laundry.

[0009] Solutions to these problems are accomplished, according to the invention, by providing a washer-dryer and a method for operating a washer-dryer as defined in the respective independent claim. Preferred embodiments of the washer-dryer and the method are defined in dependent claims, with preferred embodiments of the washer-dryer corresponding to preferred embodiments of the method, and vice versa, even if not expressly specified elsewhere herein.

[0010] In accordance with the invention there is provided a washer-dryer comprising a drum for receiving laundry to be treated, the drum disposed in a tub and rotatable about an axis and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device for controlling operation of the washer-dryer, the control device including a weighing device for determining a load of laundry present in the drum, a display device for displaying information to a user, and a setting device for receiving input settings from the user, wherein the control device is configured for, upon receiving the laundry into the drum and receiving an input by the setting device for starting treatment of the laundry by washing and drying, weighing the laundry and determining a load of the laundry by the weighing device, comparing the load to the second load, and if the load does not exceed the second load, controlling the display device for displaying a first indication that treatment by washing and drying the laundry in the drum may be performed in a continuous process, and if the load exceeds the second load, controlling the display device for displaying a second indication that the treatment by washing and drying the laundry will be interrupted after washing, and the user prompted to remove laundry with a load in excess of the second load from the drum prior to starting drying the laundry.

[0011] In accordance with the invention there is also provided a method of operating a washer-dryer comprising a drum for receiving laundry to be treated, the drum disposed in a tub and rotatable about an axis and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device for controlling operation of the washer-dryer, the control device including a weighing device for determining a load of laundry present in the drum, a display device for displaying information to a user, and a setting device for receiving input settings from the user. The method includes the following steps:

a) upon receiving the laundry into the drum and receiving an input by the setting device for starting treatment of the laundry by washing and drying, weighing the laundry and determining a load of the laundry by the weighing device;

b) comparing the load to the second load, and if the load does not exceed the second load, displaying a first indication by the display device that treatment by washing and drying the laundry in the drum may be performed in a continuous process, and if the load exceeds the second load, displaying a second indication by the display device that the treatment by washing and drying the laundry will be interrupted after washing; and prompting the user to remove laundry with a load in excess of the second load from the drum prior to starting drying the laundry.

[0012] The invention provides extended ease of use of the respective washer-dryer by enabling the user to avoid attention to the washer-dryer before fully finishing washing and drying a load of laundry if this load does not exceed the maximal load acceptable for being dried in the washer-dryer. The invention combines advantageously with automatic control and autonomous treatment processes of the washer-dryer such as automatic dosing of detergents, softeners and other agents as conventionally added to washing suds, adaptation of processes to actual loads of laundry, and prediction of duration of processes in dependence of actual loads of laundry.

[0013] In a preferred embodiment of the invention the control device is also configured to, if the load does not exceed the second load, prompt the user to determine if the treatment by washing and drying is to be executed continuously. This allows the user to have the complete washing and drying process run autonomously until its end, or alternatively retain the possibility to have access to the laundry after washing but prior to drying, for extracting part of the laundry or adding additional laundry prior to drying.

[0014] In an additional preferred embodiment of the invention the control device is configured to, if the load exceeds the second load, interrupting the treatment and controlling the display device for displaying a third indication prompting the user to remove laundry with a load in excess of the second load from the drum and re-start the treatment by providing input to the setting device. This allows the user to remove laundry in excess of the second load prior to the washing step, and enables having a continuous washing and drying process executed with excess laundry remaining dry and without any treatment, for processing at a later time. It is clear that this option is viable only if the weighing procedure is performed without adding any liquid to laundry for the purpose of weighing as in some embodiments to be described subsequently.

[0015] In another preferred embodiment of the invention the control device is configured for, upon receiving the laundry into the drum and receiving an input by the setting device for starting treatment of the laundry by drying only, weighing the laundry and determining a load of the laundry by the weighing device, comparing the load to the second load, and if the load does not exceed the second load, controlling the display device for displaying a fourth indication that treatment by drying the laundry in the drum may be performed, and if the load exceeds the second load, controlling the display device for displaying a fourth indication prompting the user to remove laundry with a load in excess of the second load from the drum prior to starting drying the laundry. Thereby advantage is taken of the availability of the weighing device for evaluating the laundry prior to executing a drying process, applying it to evaluate if a given load of laundry is below the maximum capacity of the washer-dryer for drying the laundry. It is observed that the operation of the weighing device has to account for that the laundry placed into the drum for drying only is usually wet to a degree of around 50% of the dry mass of the laundry, thereby increasing the total mass substantially in relation to the situation where dry laundry is placed into the drum for washing.

[0016] In a further preferred embodiment of the invention the control device is configured to interrupt operation after a washing treatment of laundry in the drum, and resume operation after receiving an input from the user via the setting device, and also configured to, if the load does not exceed the second load, display an indication on the display device that no extraction of laundry from the drum is necessary prior to providing the input for resuming operation to the setting device. Thereby the user is informed of the appropriateness of a given load of laundry for drying even if the washer-dryer has interrupted operation after washing and prior art drying, making it clear that operation can be continued by giving a respective input to the setting device without prior extracting laundry from the drum.

[0017] In yet another preferred embodiment of the invention the washer-dryer includes a suspension device suspending the tub in the washer-dryer, wherein the weighing device is attached to the suspension device for measuring an extension value of the suspension device incurred by the laundry placed in the drum. Suspension devices are generally necessary for tubs having rotatable

drums, for adapting to, and dissipating of, dynamic forces generated by imbalances caused by uneven distribution of laundry in the drum as the drum spins at elevated speed, particularly for dewatering the laundry after completing treatment for washing. By attaching the weighing device to the suspension device the invention advantageously applies existing components of the washer-dryer for its purpose.

[0018] In yet a further preferred embodiment of the invention the weighing device includes an elongation sensor device including at least one elongation sensor. There is no specific precaution to be observed in selecting the elongation sensor. Specifically an elongation sensor which is present in the washer-dryer for any other purpose may be applied in implementing the invention. Such elongation sensors may be: A 3D sensor which evaluates deformations of a shaft attached to the drum and used both for bearing the drum in the tub and for driving the drum to rotate by a motor external to the tub. Such 3D sensor may be located in a bearing located in the tub which is traversed by the said shaft, and may even include components such as magnets included in the shaft. Deformations detectable by the 3D sensor are caused by laundry placed in the drum and causing elastic strain of the shaft. Alternatives to the 3D sensor may be an extensiometric gauge attached to a spring which is part of a suspension system, or a displacement sensor attached to a shock absorber which is also part of the suspension system. Likewise a sensor could be applied which determines the location of the tub within the washer-dryer by contactless means such as a laser distance sensor. Of course measurements from a plurality of sensors may be combined for evaluating an actual load of laundry in the drum. This pertains to sensor devices mentioned in this chapter as well as to such devices mentioned hereinbelow.

[0019] In still another preferred embodiment of the invention the measuring device is configured for determining the load of the laundry from data related to moving the laundry by rotating the drum. With further preference such data may include at least one selected from the group consisting of: torque of the drum rotating with the laundry; amount of liquid needed for completely soaking the laundry in the drum; level of liquid in the drum after introducing a predetermined amount of liquid into the drum and rotating the drum so as to soak the laundry with the liquid. These are indirect measurements which apply an increase in the moment of inertia of the drum which is increased by loading laundry, thereby incurring an increased torque necessary for turning the drum at a prescribed speed, which may be measured by assessing the related electric load imposed on the motor driving the drum to rotate. Further data related to the laundry's capability of absorbing water may be applied in determining the load of laundry present in the drum. Such data may be assessed shortly after initiating a washing procedure for laundry. It is observed that in such embodiments the invention proceeds shortly after the washing process is initiated, whereas methods for measurements described in preceding chapters may be performed prior to initiating a washing process.

[0020] In again another preferred embodiment of the invention the control device is configured for applying the load of laundry determined to adjust a process for treating the laundry. With further preference the adjustment of a process for treating the laundry may include at least one selected from the group consisting of: duration of the process; addition of detergent to the process; addition of water to the process; addition of heat to the process. Thereby data obtained by applying the invention may be used in adapting a process for treating the laundry, which may further enhance the benefit to be obtained by the user.

[0021] In again a further preferred embodiment of the invention the control device is configured for applying the load of laundry determined to predict duration of the process for treating the laundry that has actually been selected by the user. Thereby user's benefit is further enhanced by providing information about when termination of the laundry treatment process may be reasonably expected, relieving the user from own considerations in such regards.

[0022] In again an additional preferred embodiment of the invention the display device and the setting device are included in a communication unit which is spatially separable from the washer-dryer and communicates with the washer-dryer wirelessly. Thereby the user may apply a smartphone or other communication unit including capability to receive input from a user and applied as the setting device, and capability to provide displays to a user and applied as the display device, and being linked to the washer-dryer by a wireless communication interface such as Bluetooth and Wi-Fi, for controlling operation of the washer-dryer. In such context the definition that the control device includes the display device and the setting device appears not to require some spatial unity of the control device, but also allows that items of the control device as the display device and the setting device are arranged in spatial independence of the washer-dryer with the drum and other hardware for executing washing and drying processes, and communicate with the washer-dryer through a wireless channel.

[0023] Further details, benefits and advantages of the invention will appear from the subsequent description of specific embodiments with references to the Figures in the attached drawing. In this drawing:

Figure 1 shows a schematic section of a washer-dryer according to the invention;

Figure 2 shows a flow diagram of a washing and drying method for execution in a washer-dryer according to the invention; and

Figure 3 shows a communication unit applied for providing the display device and the setting de-

vice remote to the washer-dryer.

[0024] As shown in Fig. 1 the washer-dryer 1 comprises a drum 3 for receiving laundry 6 to be treated, the drum 3 disposed in a tub 2 and rotatable about an axis 4 and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load. A suspension device 5 is provided for suspending tub 2 in the washer-dryer, the suspension device 5 including springs and shock absorbers according to common practice. Presently only two springs 5 are shown by dashed lines as representatives of the suspension device 5. Laundry 6 to be processed in accordance with the invention is shown in drum 3.

[0025] Fig. 1 does not show means for bearing the drum 3 in the tub 2, and for driving the drum 3 to rotate such as an electric motor and a transmission. Fig. 1 likewise does not show means for routing water or washing suds into the tub 2, adding detergents, softeners, and other conventional agents to such water or washing suds, heating such suds, and removing such suds from the tub 2 after completing a washing process. Finally Fig. 1 does not show means for drying such as a process air channel for circulating drying air through the tub 2, and heat exchangers for heating or cooling such drying air, as eventually included in a heat pump.

[0026] A control device 7 is provided for controlling operation of the washer-dryer 1, the control device 7 including a weighing device 8 for determining a load of the laundry 6 present in the drum 3, a display device 9 for displaying information to a user, and a setting device 10 for receiving input settings from the use. The display device 9 and the setting device 10 constitute the washer-dryer's user interface, allowing pertinent information to be displayed by display device 6, and pertinent user input provided to control device 7 by the setting device 10.

[0027] According to the invention the control device 7 is configured for, upon receiving the laundry 6 into the drum 3 and receiving an input by the setting device 10 for starting treatment of the laundry 6 by washing and drying, weighing the laundry 6 and determining a load of the laundry 6 by the weighing device 8, comparing the load to the second load, and if the load does not exceed the second load, controlling the display device 9 for displaying a first indication that treatment by washing and drying the laundry 6 in the drum 3 may be performed in a continuous process, and if the load exceeds the second load, controlling the display device 9 for displaying a second indication that the treatment by washing and drying the laundry 6 will be interrupted after washing, and the user prompted to remove laundry with a load in excess of the second load from the drum 3 prior to starting drying the laundry 6.

[0028] As a preferred option the control device 4 is configured to, if the load exceeds the second load, interrupting the treatment and controlling the display device 6 for displaying a third indication prompting the user to remove laundry 6 with a load in excess of the second load from the drum 3 and re-start the treatment by providing input to the setting device 10. This allows the user to remove laundry 6 in excess of the second load prior to the washing step, and enables having a continuous washing and drying process executed with excess laundry remaining dry and without any treatment, for processing at a later time.

[0029] A method according to the invention is shown in Fig. 2 in an essentially self-explanatory fashion. Upon starting the process for washing and drying a load I of laundry 6 placed in drum 3 of washer-dryer 1 a step of detecting load I by weighing device 8 is performed, be it by direct measurement of weight via an elongation sensor attached to a suspension device 5 in the washer-dryer or by indirect measurement via determination of water absorption by laundry 6, as described above.

[0030] In particular measuring device 7 may be configured for determining the load I of laundry 6 from data related to moving laundry 6 by rotating drum 3. Specifically such data may include at least one of torque or moment of inertia of drum 3 rotating with laundry 6, amount of liquid needed for completely soaking laundry 6 in drum 3, level of liquid in drum 3 after introducing a predetermined amount of liquid into drum 3 and rotating drum 3 so as to soak laundry 6 with the liquid.

[0031] Subsequently the measured load I is compared to the predetermined second load 12 which is the maximum load that the washer-dryer can handle for drying.

[0032] If I exceeds I2 the method proceeds by washing laundry 6, and suspending further progress by displaying a message on the display device 9 which prompts the user to remove an excess part of laundry 6 from drum 3, and then confirm by in input to setting device 10 for continuing the procedure. Subsequently the laundry left in drum 3 is dried, and the procedure is finished. Optionally the user may be prompted to remove the excess part immediately and prior to washing, to allow washing and drying laundry 6 remaining in drum 3 in a continuous process, and keep the excess laundry dry and without treatment for processing at a later time. It is clear that this option is viable only if the weighing procedure is performed without adding any liquid to laundry 6 for the purpose of weighing.

[0033] If I does not exceed 12, thereby qualifying the full load of laundry 6 in drum 3 for drying, another message is displayed on display device 6 prompting the user to indicate if suspension of the procedure prior to drying is desired. If that is the case, the procedure continues as described in the preceding chapter by suspending after washing and prior to drying, continuing after receiving user's input via setting device 10 only. If that is not the case the procedure continues from washing through drying to the finish without any further suspension.

[0034] If a process for just drying a batch of laundry 6 in drum 3 is desired, the process can also profit from weighing laundry 6 prior to performing the drying step, and informing the user of the load I exceeds the maximum

value 12, for avoiding a drying process with and excessive load of laundry 6 in drum 3. This information may include a prompt to remove excess laundry from drum 3 prior to initiating the drying process. Of course, the weighing procedure has to account for that laundry 6 placed into drum 3 for drying only is wet to a degree of around 50% of the dry mass of the laundry, thereby increasing the total mass substantially in relation to the situation where dry laundry is placed into the drum for washing.

[0035] The invention may further provide control device 7 to be configured for applying the load of laundry 6 determined to adjust a process for treating laundry 6. The adjustment of a process for treating laundry 6 may include one of: duration of the process; addition of detergent to the process; addition of water to the process; addition of heat to the process.

[0036] The invention may also provide for control device 7 to be configured for applying the load of laundry 6 determined for predicting a duration of the process for treating laundry 6.

[0037] The invention provides extended ease of use of the respective washer-dryer by enabling the user to avoid attention to the washer-dryer before fully finishing washing and drying a load of laundry if this load does not exceed the maximal load acceptable for being dried in the washer-dryer. The invention combines advantageously with automatic control and autonomous treatment processes of the washer-dryer such as automatic dosing of detergents, softeners and other agents as conventionally added to washing suds, adaptation of processes to actual loads of laundry, and prediction of duration of processes in dependence of actual loads of laundry.

[0038] Fig. 3 shows the display device 9 and the setting device 10 included in a communication unit 11 which is spatially separable from the washer-dryer 1 and communicates with the washer-dryer 1 wirelessly. Communication unit 11 may be a smartphone or tablet computer appropriately programmed by hosting an app, including capability to receive input from a user and applied as the setting device 10, and capability to provide displays to a user and applied as the display device 6. A link to the washer-dryer 1 is established by a wireless communication interface such as Bluetooth and Wi-Fi, for controlling operation of the washer-dryer 1. It is noted that the control device 7 including the display device 9 and the setting device 10 is not meant to require some spatial unity of the control device 4 within or at the washer-dryer 1, but is meant to allow also that items of the control device 4 as the display device 9 and the setting device 10 may be arranged in spatial independence of the washer-dryer 1 with the drum 3 and other hardware for executing washing and drying processes, and communicate with the washer-dryer 1 through a wireless channel.

LIST OF REFERENCE NUMERALS

[0039]

1	Washer-dryer
2	Tub
3	Drum
4	Axis
5	Suspension device
6	Laundry
7	Control device
8	Weighing device
9	Display device
10	Setting device
11	Communication unit

Claims

1. A washer-dryer (1) comprising a drum (3) for receiving laundry (6) to be treated, the drum (3) disposed in a tub (2) and rotatable about an axis (4) and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device (7) for controlling operation of the washer-dryer (1), the control device (7) including a weighing device (8) for determining a load of laundry (6) present in the drum (3), a display device (9) for displaying information to a user, and a setting device (10) for receiving input settings from the user, **characterized in that** the control device (7) is configured for, upon receiving the laundry (6) into the drum (3) and receiving an input by the setting device (10) for starting treatment of the laundry (6) by washing and drying, weighing the laundry (6) and determining a load of the laundry (6) by the weighing device (8), comparing the load to the second load, and if the load does not exceed the second load, controlling the display device (9) for displaying a first indication that treatment by washing and drying the laundry (6) in the drum (3) may be performed in a continuous process, and if the load exceeds the second load, controlling the display device (9) for displaying a second indication that the treatment by washing and drying the laundry (6) will be interrupted after washing, and the user prompted to remove laundry with a load in excess of the second load from the drum (3) prior to starting drying the laundry (6).

2. The washer-dryer (1) according to claim 1, wherein the control device (7) is also configured to, if the load does not exceed the second load, prompt the user to determine if the treatment by washing and drying is to be executed continuously.

3. The washer-dryer (1) according to claim 1, wherein the control device (7) is configured to, if the load exceeds the second load, interrupting the treatment and controlling the display device (9) for displaying a third indication prompting the user to remove laundry with a load in excess of the second load from the

drum (3) and re-start the treatment by providing input to the setting device (10).

4. The washer-dryer (1) according to one of the preceding claims, wherein the control device (7) is configured for, upon receiving the laundry (6) into the drum (3) and receiving an input by the setting device (10) for starting treatment of the laundry (6) by drying only, weighing the laundry (6) and determining a load of the laundry (6) by the weighing device (8), comparing the load to the second load, and if the load does not exceed the second load, controlling the display device (9) for displaying a fourth indication that treatment by drying the laundry (6) in the drum (3) may be performed, and if the load exceeds the second load, controlling the display device (9) for displaying a fourth indication prompting the user to remove laundry with a load in excess of the second load from the drum (3) prior to starting drying the laundry (6).

5. The washer-dryer (1) according to one of the preceding claims, wherein the control device (7) is configured to interrupt operation after a washing treatment of laundry (6) in the drum (3), and resume operation after receiving an input from the user via the setting device (10), and wherein the control device (7) is configured to, if the load does not exceed the second load, display an indication on the display device (9) that no extraction of laundry (6) from the drum (3) is necessary prior to providing the input for resuming operation to the setting device (10).

6. The washer-dryer (1) according to one of the preceding claims, including a suspension device (5) suspending the tub (2) in the washer-dryer, wherein the weighing device (8) is attached to the suspension device (5) for measuring an extension value of the suspension device (5) incurred by the laundry (6) placed in the drum (3).

7. The washer-dryer (1) according to claim 6, wherein the weighing device (8) includes an elongation sensor device including at least one elongation sensor (8).

8. The washer-dryer (1) according to one of the preceding claims, wherein the measuring device (7) is configured for determining the load of the laundry (6) from data related to moving the laundry (6) by rotating the drum (3).

9. The washer-dryer (1) according to claim 8, wherein the data includes at least one selected from the group consisting of: torque of the drum (3) rotating with the laundry (6); amount of liquid needed for completely soaking the laundry (6) in the drum (3); level of liquid in the drum (3) after introducing a predetermined amount of liquid into the drum (3) and rotating the drum (3) so as to soak the laundry (6) with the liquid.

10. The washer-dryer according to one of the preceding claims, wherein the control device (7) is configured for applying the load of laundry (6) determined to adjust a process for treating the laundry (6).

11. The washer-dryer (1) according to claim 10, wherein the adjustment of a process for treating the laundry (6) includes at least one selected from the group consisting of: duration of the process; addition of detergent to the process; addition of water to the process; addition of heat to the process.

12. The washer-dryer (1) according to one of the preceding claims, wherein the control device (7) is configured for applying the load of laundry (6) determined to predict a duration of the process for treating the laundry (6).

13. The washer-dryer (1) according to one of the preceding claims, wherein the display device (9) and the setting device (10) are included in a communication unit (11) which is spatially separable from the washer-dryer (1) and communicates with the washer-dryer (1) wirelessly.

14. A method of operating a washer-dryer (1) comprising a drum (3) for receiving laundry (6) to be treated, the drum (3) disposed in a tub (2) and rotatable about an axis (4) and having a load not exceeding first load to be washed and having a load less than a second load to be dried, wherein the second load is smaller than the first load, a control device (7) for controlling operation of the washer-dryer (1), the control device (7) including a weighing device (8) for determining a load of laundry (6) present in the drum (3), a display device (9) for displaying information to a user, and a setting device (10) for receiving input settings from the user, **characterized in that** the method includes the following steps:

a) upon receiving the laundry (6) into the drum (3) and receiving an input by the setting device (10) for starting treatment of the laundry (6) by washing and drying, weighing the laundry (6) and determining a load of the laundry (6) by the weighing device (8);

b) comparing the load to the second load, and if the load does not exceed the second load, displaying a first indication by the display device (9) that treatment by washing and drying the laundry (6) in the drum (3) may be performed in a continuous process, and if the load exceeds the second load, displaying a second indication by the display device (9) that the treatment by washing and drying the laundry (6) will be inter-

rupted after washing; and prompting the user to remove laundry with a load in excess of the second load from the drum (3) prior to starting drying the laundry (6).

15. The method according to claim 14, wherein, in step b and if the load exceeds the second load, the control device (7) interrupts the treatment and controls the display device (9) for displaying a third indication prompting the user to remove laundry with a load in excess of the second load from the drum (3) and restart the treatment by providing input to the setting device (10).

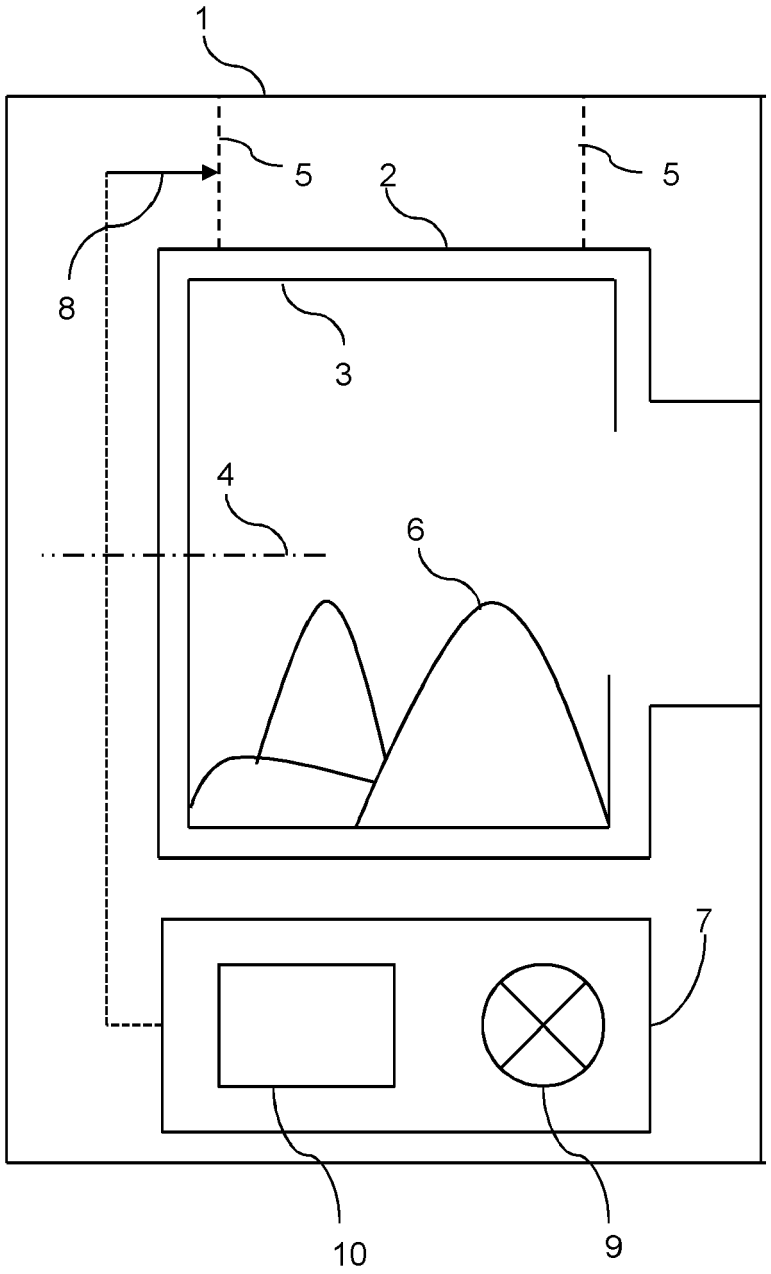

Fig. 1

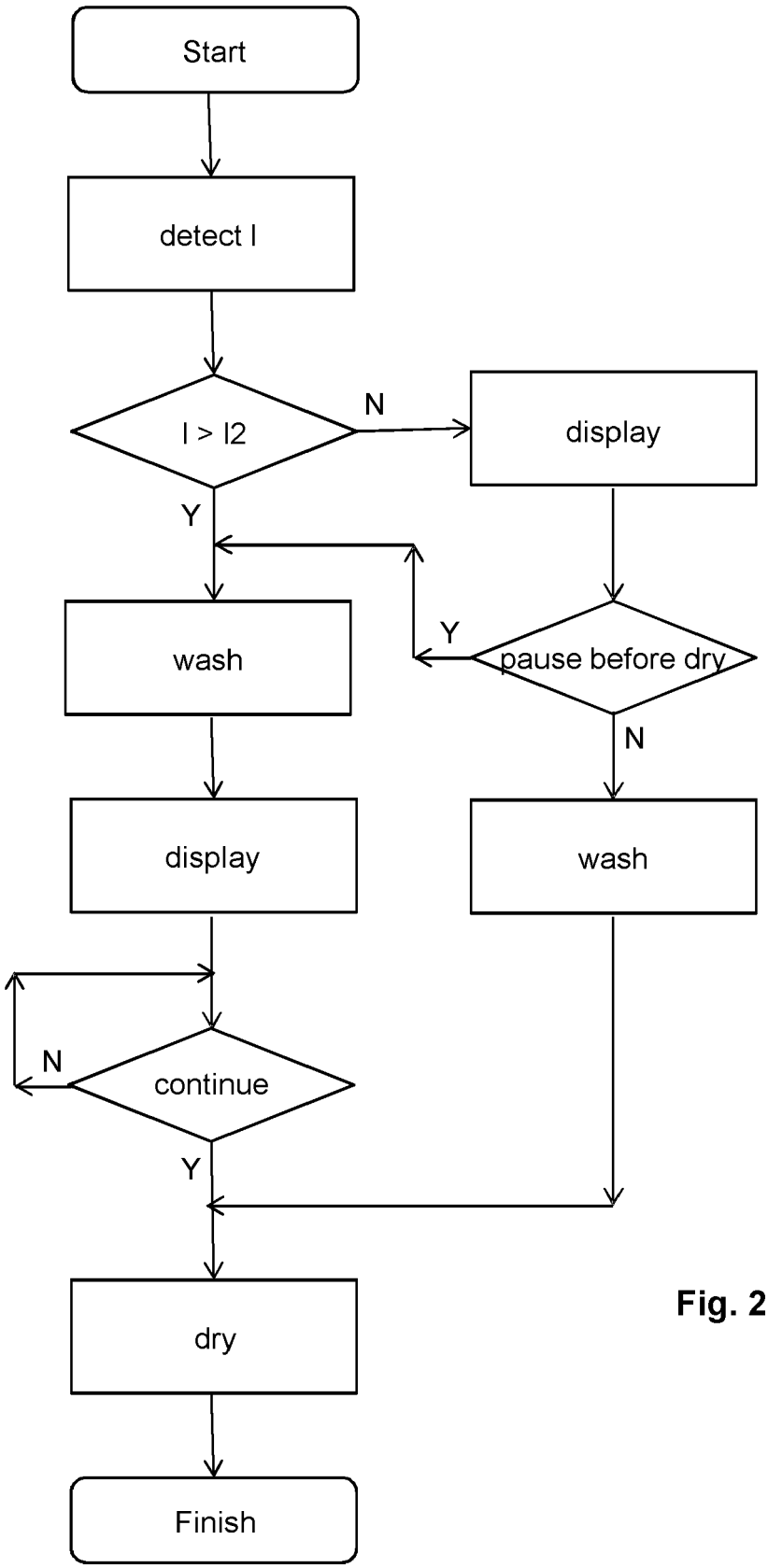
Start
detect I
I > I2
N
display
Y
wash
Y
pause before dry
N
display
wash
N
continue
Y
dry
Finish

Fig. 2

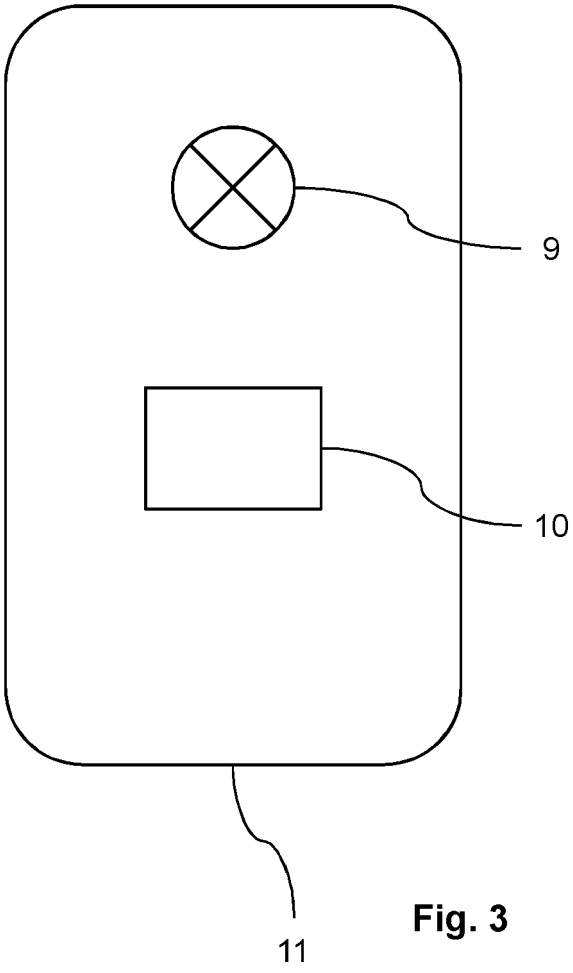

Fig. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 15 4001

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	GB 2 247 250 A (HITACHI LTD [JP]) 26 February 1992 (1992-02-26) * page 19, line 8 - page 32, line 24 * * figures 1-11 * -----	1-15	INV. D06F33/68 D06F34/18 ADD. D06F103/04 D06F105/58 D06F25/00
A	EP 3 257 994 A1 (ELECTROLUX APPLIANCES AB [SE]) 20 December 2017 (2017-12-20) * paragraphs [0043] - [0075] * * pages 1-6 * -----	1-3,10, 14,15	
A	DE 10 2016 225609 A1 (BSH HAUSGERAETE GMBH [DE]) 21 June 2018 (2018-06-21) * paragraphs [0010] - [0012] * * paragraphs [0039] - [0043] * * figure 1 * -----	1,14	
A	CN 101 886 319 B (HAIER GROUP CO LTD; QINGDAO HAIER WASHING MACH CO) 28 August 2013 (2013-08-28) * abstract * * paragraphs [0021] - [0045] * * figures 1-4 * -----	1,14	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 June 2021	Weidner, Maximilian

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
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 15 4001

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-06-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2247250 A	26-02-1992	NONE	
EP 3257994 A1	20-12-2017	AU 2017284906 A1	15-11-2018
		CN 109312516 A	05-02-2019
		EP 3257994 A1	20-12-2017
		US 2019292706 A1	26-09-2019
		WO 2017215897 A1	21-12-2017
DE 102016225609 A1	21-06-2018	NONE	
CN 101886319 B	28-08-2013	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2010018201 A1 **[0003] [0006]**
- EP 3109356 A1 **[0007]**