



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.08.2020 Bulletin 2020/32

(51) Int Cl.:
D06F 39/04 ^(2006.01) **A47L 15/42** ^(2006.01)
D06F 39/08 ^(2006.01)

(21) Application number: **19219855.4**

(22) Date of filing: **27.12.2019**

(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: **01.02.2019 TR 201901518**

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(54) **A WASHING DEVICE AND AN OPERATION METHOD THEREOF**

(57) The washing device according to the present invention having a quick washing operation comprises a tub (1) having an outlet (5); a drum (2) which is located in the tub (1) so as to be rotatable around an axis; a delivery line (3) for transferring water to the tub (1); a circulation line (6) which is connected from one side with the outlet (5) provided at the tub (1), opens into the drum (2) from another side via the tub (1), and enables the water received into the tub (1) to be recirculated and delivered to the drum (2), and accordingly, to the laundry in the drum (2); a discharge element (7) controlling connection of the circulation line (6) with a discharge line; a pump (9) which is located at the circulation line (6) and enables the water/liquid to be circulated between the tub (1) and the drum (2) by means of the circulation line (6); a first heater (10) which is located at the tub (1) and enables the water received into the tub (1) to be heated; a second heater (8) which is located at the circulation line (6) and enables the water/liquid passing through the circulation line (6) to be heated; and a control unit which regulates operation of the washing device.

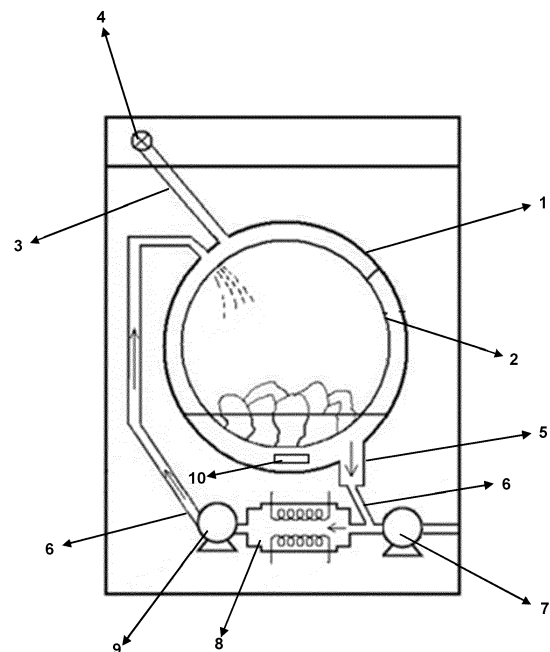


Figure – 1

Description

Technical Field

[0001] The present invention relates to washing devices having a quick washing operation, and operation methods thereof.

Background of the Invention

[0002] Prior art washing devices used for cleaning textile products may comprise a quick washing operation for cleaning the laundry in a fast manner in particular if there is a time limitation, as well as a normal washing operation for cleaning the laundry at normal washing time period. However, in this quick washing operation, either the laundry cannot be cleaned as desired or it allows a very small amount of laundry to be cleaned as desired. In that case, quick washing process cannot be used and user needs cannot be met in cases where laundry amount is large and effective cleaning is required.

[0003] In prior art washing devices, a heater enabling the water to be heated is located either at a tub of the washing device or a circulation line for circulating water between the tub and drum. In devices in which the heater is provided at the tub, the circulation system cannot be activated while the water is heated and the water cannot be heated during a circulation process since a certain level of water is required for the heater to operate. Thus, although the water reaches a high temperature in a short span of time, the temperature of water decreases extremely as a heating process cannot be performed, therefore it is not possible to wash a large amount of laundry with the quick washing operation. On the other hand, in devices where the heater is provided on the circulation line, the heater provided on the line is operated at a low power for avoiding lime depositing and preventing a thermal protector from becoming active. In such devices, since it is made possible to perform heating during the circulation, a good washing performance is achieved with the normal washing operation and a large amount of laundry is able to be washed in an efficient manner; however, with the quick washing operation, an efficient cleaning cannot be achieved because heating of water takes a long period of time due to the low operating power.

Brief Description of the Invention

[0004] The washing device according to the present invention having at least one normal washing operation, and at least one quick washing operation, which provides washing in a shorter time than the normal washing operation and comprises at least one water intake process, at least one main washing process, at least one rinsing process and at least one spinning process, comprises at least one tub having at least one outlet; at least one drum which is located in the tub so as to be rotatable around an axis; at least one delivery line for transferring water

from a water source to the tub; at least one circulation line which is connected from one side with the outlet provided at the tub, opens into the drum from another side via the tub, and enables the water received into the tub to be recirculated and delivered to the drum, and accordingly, to the laundry in the drum; at least one discharge element controlling connection of the circulation line with a discharge line; at least one pump which is located at the circulation line and enables the water/liquid to be circulated between the tub and the drum by means of the circulation line; at least a first heater which is located at the tub and enables the water received into the tub to be heated; at least a second heater which is located at the circulation line and enables the water/liquid passing through the circulation line to be heated; and at least one control unit which regulates operation of the washing device.

[0005] The operation method according to the present invention comprises the steps of: selecting the quick washing operation by the user by means of a control panel provided at the washing device; then, initiating the water intake process and receiving water into the tub via the delivery line to provide accumulation of water in the tub, and at the same time, initiating rotation of the drum to proceed to the main washing process of the quick washing operation; after receiving a first amount of water stored at the control unit into the tub, operating a first heater located at the tub for a first time period stored at the control unit and stopping operation of the first heater at the end of the first time period; after the first time period is completed, operating the pump to initiate recirculation process of water between the tub and the drum, and performing the recirculation process and operating a second heater located at the circulation line for a second time period stored at the control unit; stopping operation of the pump and the second heater at the end of the second time period, and then, operating the first heater for a third time period stored at the control unit; operating alternately the first heater and the second heater at said second and third time periods for a fourth time period stored at the control unit; completing the main washing process at the end of the fourth time period.

[0006] Thanks to the washing device and the operation method according to the present invention, efficiency of the quick washing operation is increased and temperature of water is enabled to reach a required temperature value in a short span of time without compromising the amount of laundry to be washed; therefore, it can be provided that the laundry is cleaned efficiently and effectively with the quick washing operation, as well.

Object of the Invention

[0007] An object of the present invention is to provide a washing device having a quick washing operation, and an operation method thereof.

[0008] Another object of the present invention is to provide a washing device which provides an efficient wash-

ing with the quick washing operation, and an operation method thereof.

[0009] Yet another object of the present invention is to provide a washing device performing the quick washing operation without compromising the amount of laundry to be washed, and an operation method thereof.

[0010] A further object of the present invention is to provide a washing device in which temperature of water is enabled to reach a required temperature in a short span of time, and an operation method thereof.

Description of the Drawings

[0011] An exemplary embodiment of the washing device according to the present invention is illustrated in the attached figure, in which:

Figure 1 is a schematic view of an exemplary embodiment of the washing device according to the invention.

[0012] All the parts illustrated in figures are individually assigned a reference numeral and the corresponding terms of these numbers are listed below:

Tub	(1)
Drum	(2)
Delivery line	(3)
Valve	(4)
Outlet	(5)
Circulation line	(6)
Discharge line	(7)
Second heater	(8)
Pump	(9)
First heater	(10)

Description of the Invention

[0013] Washing devices used for cleaning textile products generally comprise at least one tub; at least one drum which is located in the tub so as to be rotatable around an axis; at least one circulation line enabling the water received into the tub to be recirculated and returned to the drum; and a pump for performing the circulation. In said washing devices, a heater is used for heating the water, wherein the heater may be located at the tub or the circulation line. However, especially in washing devices having a quick washing operation, depending on the location of heater, use of the heater either causes undesired washing performance due to the water not being able to reach a sufficient heat in a short span of time with the quick washing operation, or allows a lower amount of laundry to be washed than the laundry amount of the normal washing operation. This affects user satisfaction in a negative manner. Within this context, with the present invention there is provided a washing device for solving said problems, and an operation method thereof.

[0014] The washing device according to the invention, an exemplary embodiment of which is illustrated in Figure

1, has at least one normal washing operation and at least one quick washing operation which provides washing in a shorter time than the normal washing operation (the quick washing operation has at least one water intake process, at least one main washing process, at least one rinsing process and at least one spinning process), wherein the washing device further comprises at least one tub (1) having at least one outlet (5); at least one drum (2) which is located in the tub (1) so as to be rotatable around an axis; at least one delivery line (3) for transferring water from a water source (e.g. a mains supply) to the tub (1); at least one circulation line (6) which is connected from one side with the outlet (5) provided at the tub (1), opens into the drum (2) from another side via the tub (1), and enables the water received into the tub (1) to be recirculated and delivered to the drum (2), and accordingly, to the laundry in the drum (2); at least one discharge element (7) (e.g. a discharge pump or a discharge vane) controlling connection of the circulation line (6) with a discharge line; and at least one pump (9) which is located at the circulation line (6) and enables the water/liquid (the liquid may be the water which has at least one cleaning material therein) to be circulated between the tub (1) and the drum (2) by means of the circulation line (6). The washing device according to the invention also comprises at least a first heater (10) (e.g. a resistance) which is located at the tub (1) and enables the water received into the tub (1) to be heated; at least a second heater (8) (e.g. a resistance) which is located at the circulation line (6) preferably between the pump (9) and the outlet (5), and enables the water/liquid passing through the circulation line (6) to be heated; and at least one control unit which regulates operation of the washing device.

[0015] The operation method according to the present invention comprises the steps of: selecting the quick washing operation by the user by means of a control panel provided at the washing device; then, initiating the water intake process and receiving water into the tub (1) via the delivery line (3) to provide accumulation of water in the tub (1), and at the same time, initiating rotation of the drum (2) (in this process, both the discharge element (7) is in a closed position in which connection of the circulation line (6) and the discharge line is blocked, and the pump (9) is not operated and there is no recirculation of water between the tub (1) and the drum (2)) to proceed to the main washing process of the quick washing operation; after receiving a first amount of water (the first amount of water may be a required amount of water for the quick washing operation or an amount of water that is less than said amount of water to a certain extent [e.g. fifty-fifty or one-third of said amount]) stored at the control unit into the tub (1), operating a first heater (10) located at the tub (1) for a first time period which is stored at the control unit and is preferably within the range of 8 to 12 minutes (or until the water in the tub (1) reaches a first temperature value) and stopping operation of the first heater (10) at the end of the first time period; after

the first time period is completed, operating the pump (9) to initiate recirculation process of water between the tub (1) and the drum (2), and performing the recirculation process and operating a second heater (8) located at the circulation line (6) for a second time period (the second time period is preferably within the range of 3 to 7 minutes) which is stored at the control unit and is the same or different from the first time period; stopping operation of the pump (9) and the second heater (8) at the end of the second time period, and then, operating the first heater (10) for a third time period which is stored at the control unit and is preferably within the range of 3 to 7 minutes (the third time period may be the same with the first and/or the second time period or different from the first and/or the second time period); operating alternately the first heater (10) and the second heater (8) at said second and third time periods for a fourth time period which is stored at the control unit and is preferably within the range of 45 to 50 minutes; completing the main washing process at the end of the fourth time period.

[0016] In an exemplary embodiment of the invention, the user selects the quick washing operation via the control panel of the washing device, therefore, a command is provided to the control unit indicating that the quick washing operation is selected. The control unit initiates the water intake process of the washing operation, and water intake is provided to the tub (1) by means of the delivery line (3). During the water intake, water starts accumulating since the discharge element (7) and the pump (9) are closed, and at that moment, the drum (2) is started to be rotated. When the amount of water accumulated in the tub (1) reaches the first amount stored at the control unit, the main washing process is initiated and the first heater (10) located at the tub (1) is operated. The first heater (1) is stopped after being operated for the first time period, the pump (9) is operated to initiate recirculation process between the tub (1) and the drum (2), and the second heater (8) located at the circulation line (6) is operated. Therefore, water passing through the circulation line (6) is continued to be heated via the second heater (8). The second heater (8) is stopped after being operated for the second time period, and the pump (9) is brought into the closed position to complete the recirculation process. After that, the first heater (10) is re-operated and is enabled to remain active for a third time period to continue to heat the water. Then, the second heater (8) is re-operated, therefore the first heater (10) and the second heater (8) are enabled to operate alternately for the fourth time period. After the fourth time period has passed, the main washing process is completed and the next process (e.g. rinsing process or spinning process) defined for the quick washing operation is initiated. Thanks to the washing device and operation method according to the present invention, it can be enabled that the washing device performs the quick washing operation in a more efficient and effective manner. Thus, both the need of decreasing the amount of laundry to be washed is eliminated, and the water temperature value

defined for the main washing process can be reached within the required time period. This allows a desired amount of laundry to be cleaned efficiently in a short span of time and increases user satisfaction.

[0017] In a preferred embodiment of the washing device according to the present invention, the washing device preferably comprises at least one valve (4) which controls water inflow to the delivery line (3). Said valve (4) is preferably connected with the control unit, wherein when the user activates the washing device by means of the control panel, he/she opens the valve (4) for water intake to the tub (1), and water is received into the tub (1) via the delivery line (3). After a sufficient amount of water is received into the tub (1), the valve (4) is closed and water intake from the water source into the tub (1) is stopped.

[0018] In a preferred embodiment of the operation method according to the present invention, the operation method comprises the steps of: rotating the drum (2) during the main washing process for a fifth time period (the fifth time period is preferably within the range of 87 to 93 seconds, in particular 90 seconds) at a first rotation speed (e.g. 53rpm) in a first direction (e.g. anti-clockwise); then, stopping the rotation of the drum (2) for a sixth time period (e.g. 5 seconds); after that, rotating the drum (2) for a seventh time period (the seventh time period is preferably within the range of 82 to 88 seconds, in particular 85 seconds) at the first rotation speed (e.g. 53rpm) in a second direction (e.g. clockwise) that is opposite to the first direction; then, stopping the rotation of the drum (2) for the sixth time period, and rotating the drum (2) during the main washing process alternately between the first and second directions as indicated. Due to the fact that the drum (2) is rotated in different directions for different time periods, displacement amount of laundry is varied, and this allows the laundry to be subjected to a more efficient mechanical force and enables the laundry to be cleaned in a more effective manner with the quick washing process.

[0019] Thanks to the washing device and the operation method according to the present invention, efficiency of the quick washing operation is increased and temperature of water is enabled to reach a required temperature value in a short span of time without compromising the amount of laundry to be washed; therefore, it can be provided that the laundry is cleaned efficiently and effectively with the quick washing operation, as well.

Claims

1. A washing device having at least one normal washing operation, and at least one quick washing operation, which provides washing in a shorter time than the normal washing operation and comprises at least one water intake process, at least one main washing process, at least one rinsing process and at least one spinning process, and comprising:

- at least one tub (1) having at least one outlet (5);
- at least one drum (2) which is located in the tub (1) so as to be rotatable around an axis;
- at least one delivery line (3) for transferring water from a water source to the tub (1);
- at least one circulation line (6) which is connected from one side with the outlet (5) provided at the tub (1), opens into the drum (2) from another side via the tub (1), and enables the water received into the tub (1) to be recirculated and delivered to the drum (2), and accordingly, to the laundry in the drum (2);
- at least one discharge element (7) controlling connection of the circulation line (6) with a discharge line; and
- at least one pump (9) which is located at the circulation line (6) and enables the water/liquid to be circulated between the tub (1) and the drum (2) by means of the circulation line (6);

characterized by comprising:

- at least a first heater (10) which is located at the tub (1) and enables the water received into the tub (1) to be heated;
 - at least a second heater (8) which is located at the circulation line (6) and enables the water/liquid passing through the circulation line (6) to be heated; and
 - at least one control unit which regulates operation of the washing device.
2. A washing device according to Claim 1, **characterized in that** the second heater (8) is located at the circulation line (6) between the pump (9) and the outlet (5).
 3. A washing device according to Claim 1, **characterized by** comprising at least one valve (4) which controls water inflow to the delivery line (3).
 4. An operation method for a washing device according to any of the preceding claims, **characterized by** comprising the steps of:
 - selecting the quick washing operation by the user by means of a control panel provided at the washing device;
 - then, initiating the water intake process and receiving water into the tub (1) via the delivery line (3) to provide accumulation of water in the tub (1), and at the same time, initiating rotation of the drum (2) to proceed to the main washing process of the quick washing operation;
 - after receiving a first amount of water stored at the control unit into the tub (1), operating a first heater (10) located at the tub (1) for a first time period stored at the control unit and stop-

ping operation of the first heater (10) at the end of the first time period;

- after the first time period is completed, operating the pump (9) to initiate recirculation process of water between the tub (1) and the drum (2), and performing the recirculation process and operating a second heater (8) located at the circulation line (6) for a second time period stored at the control unit;
- stopping operation of the pump (9) and the second heater (8) at the end of the second time period, and then, operating the first heater (10) for a third time period stored at the control unit;
- operating alternately the first heater (10) and the second heater (8) at said second and third time periods for a fourth time period stored at the control unit;
- completing the main washing process at the end of the fourth time period.

5. An operation method according to Claim 4, **characterized in that** the first amount of water is a required amount of water for the quick washing operation.
6. An operation method according to Claim 4, **characterized in that** the first amount of water is an amount of water that is less than the required amount of water for the quick washing operation to a certain extent.
7. An operation method according to Claim 4, **characterized in that** the first time period is within the range of 8 to 12 minutes.
8. An operation method according to Claim 4, **characterized in that** the second time period is within the range of 3 to 7 minutes.
9. An operation method according to Claim 4, **characterized in that** the third time period is within the range of 3 to 7 minutes.
10. An operation method according to Claim 4, **characterized in that** the fourth time period is within the range of 45 to 50 minutes.
11. An operation method according to any of the claims 4 to 10, **characterized by** comprising the steps of:
 - rotating the drum (2) during the main washing process for a fifth time period at a first rotation speed in a first direction;
 - then, stopping the rotation of the drum (2) for a sixth time period;
 - after that, rotating the drum (2) for a seventh time period at the first rotation speed in a second direction that is opposite to the first direction;
 - then, stopping the rotation of the drum (2) for the sixth time period; and

- rotating the drum (2) during the main washing process alternately between the first and second directions as indicated.

12. An operation method according to Claim 11, **characterized in that** the fifth time period is within the range of 87 to 93 seconds. 5
13. An operation method according to Claim 11, **characterized in that** the first rotation speed is 53rpm. 10
14. An operation method according to Claim 11, **characterized in that** the sixth time period is 5 seconds.
15. An operation method according to Claim 11, **characterized in that** the seventh time period is within the range of 82 to 88 seconds. 15

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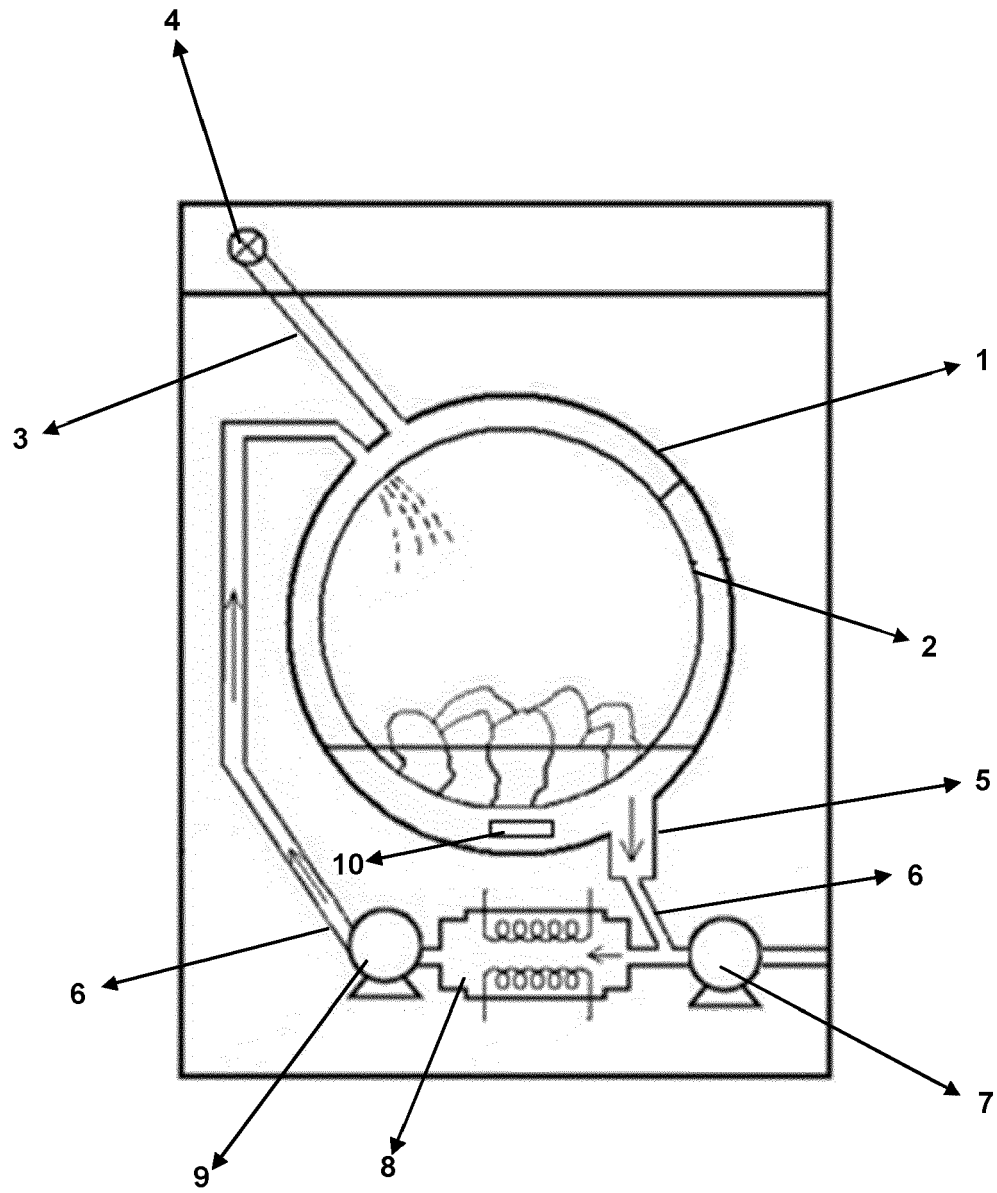


Figure – 1



EUROPEAN SEARCH REPORT

Application Number
EP 19 21 9855

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Y	* paragraph [0009] - paragraph [0011] * * paragraph [0015] - paragraph [0044] * * figure 1 *	2	
Y	----- WO 2018/162211 A1 (ARCELIK AS [TR]; INNOVEL DANISMANLIK VE IMALAT SANAYI [TR]) 13 September 2018 (2018-09-13) * paragraph [0047]; figure 9 *	2	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 February 2020	Examiner Kising, Axel
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
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EP 19 21 9855

5 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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