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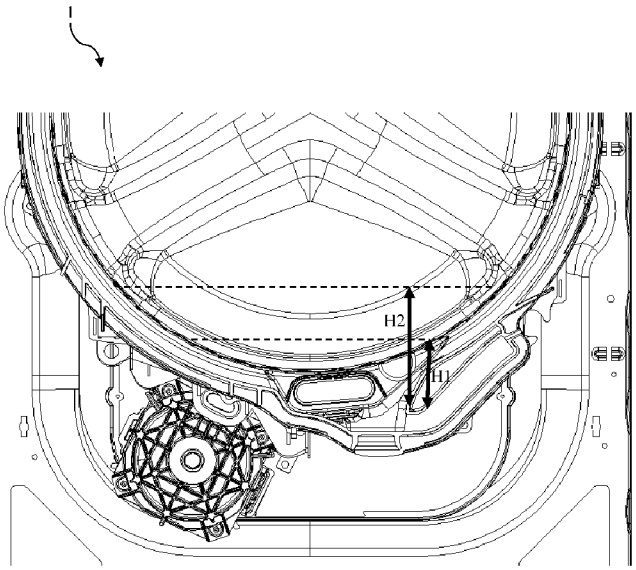
(54) **Title:** WASHER WITH LATER LOAD ADDING FUNCTION/ A LOAD ADDING METHOD FOR WASHER-DRYERS

Figure 1



(57) **Abstract:** The present invention relates to a method executed by a control unit (8) for adding load, after activation thereof, into a washing appliance (1) comprising a door (2), a lock (3) to lock the door (2), a drum (4) to place laundry items (C) therein, a tub (5) for the drum (4) to move therein, an engine (6) to rotate the drum (4), a load addition button (7), and a control unit (8) connected to said load addition button (7), lock (3) and the engine (6); comprising the steps of detecting a command from the load addition button (7), halting the engine (6) rotating the drum (4), unlocking the lock (3) of the door (2), querying whether the door (2) is opened throughout a predetermined duration, if the door (2) is not opened throughout the predetermined duration, then locking the lock (3) of the door (2), rotating the drum (4) by operating the engine (6) for a given duration to impregnate water to the laundry items (C) in the drum (4), and unlocking the lock (3) again in order to enable to open the door (2).

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[Continued on next page]

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Description

WASHER WITH LATER LOAD ADDING FUNCTION/A LOAD ADDING METHOD FOR WASHER-DRYERS

[0001] TECHNICAL FIELD

[0002] The present invention relates to a washing appliance and a method enabling externally adding loads after beginning of its operation.

[0003] PRIOR ART

[0004] In washing machines, washing generally consists of the steps of water intake, main washing, rinsing, spinning and unloading. During washing, the rotation of a drum generates the mechanical effect required to remove dirt from the laundry items. Rotation of the drum enables the laundry items to contact each other by rubbing against one another and dirt to be removed from textile surfaces. After intake of water and detergent, rotation of the drum enables the detergent to dissolve more rapidly in water, thereby avoiding sedimentation of the detergent in a solid state.

[0005] In available washing machines, the door is locked for safety reasons after beginning of the main washing process. The chemical reactions occurring in the washing environment, high water temperatures and the water level up to the door level are some of the significant elements which necessitate safety measures. However, sometimes a user may need to add loads externally after the washing process begins. In particular, users demand adding forgotten undergarments, socks, shirts and towels after the washing process begins. Such load is kept until the next washing cycle since later load adding is not enabled to the users. This particularly leads to formation of malodors in the environment where the dirty laundry items are kept.

[0006] To add load to the washing environment, it is required to control program parameters such as engine motion and the jet system, and in particular the water level. If the door does not open immediately while a user adds laundry items, the laundry items in the drum releasing the water thereon after a while will cause the door to be locked again. This would cause dissatisfaction for a user. It Is needed to design a system and an algorithm to prevent such a circumstance.

[0007] PROBLEMS SOLVED BY THE INVENTION

[0008] The aim of the present invention is to realize a washing appliance enabling its users to externally add loads in cold washing and main washing steps. The load addition function of the invention enables adding loads again when desired by means of an algorithm independent of the duration and the load in a drum.

[0009] In an embodiment of the invention, a washing appliance enabling adding laundry items therein after being activated, comprises a door, a lock to lock the door, a drum to place laundry items therein, a tub for the drum to move therein, an engine to rotate the drum, a load addition button, and a control unit connected to the load addition button, lock and the engine. The load addition button pressed by a user for adding loads into the washing appliance after its activation, sends a command to the control unit, and upon receiving the command, the control unit halts the engine rotating the drum and unlocks the lock to enable the door to be opened. When the engine is halted, the water level in the tub is at a first level in which the water in the drum would not overflow out of the door when the door is opened. If the door is not opened throughout a predetermined duration, since the laundry items would release the water they absorbed back into the drum and therefore the water in the drum reaching a second level would overflow out of the door, the control unit reactivates the lock and operates the engine for a given duration. The laundry items is thus impregnated with the water in the drum again, lowering the water level in the drum back to the first level. Then the lock is unlocked to enable the user to add laundry items into the drum.

[0010] In another embodiment of the invention, water level is not allowed to raise by driving the jet system in the washing machines having a jet system.

[0011] DETAILED DESCRIPTION OF THE INVENTION

[0012] A washing appliance realized to achieve the aims of the present invention is illustrated in the accompanying drawings, wherein:

Figure 1: is a frontal view of the washing appliance.

Figure 2: is a side view of the washing appliance in which the water level is H2.

Figure 3: is a side view of the washing appliance in which the water level is H1.

Figure 4: is a schematic view of the control unit and the other units connected thereto.

Figure 5: is a flow chart of the method used in the preferred embodiment of the invention.

Figure 6: is a flow chart of the method used in an embodiment of the invention.

[0013] The elements in the figures are numbered individually and the correspondence of these numbers are given hereinafter.

1. Washing appliance
2. Door
3. Lock
4. Drum
5. Tub
6. Engine
7. Load addition button
8. Control unit
9. Jet line
10. Jet pump

[0014] **C.** Laundry items

[0015] **H1**. First level

[0016] **H2**. Second level

[0017] In a preferred embodiment of the invention, a washing appliance (1) enabling adding laundry items (C) therein after being activated, comprises a door (2), a lock (3) to lock the door (2), a drum (4) to place laundry items (C) therein, a tub (5) for the drum (4) to move therein, an engine (6) to rotate the drum (4), a load addition button (7), and a control unit (8) connected to the load addition button (7), lock (3) and the engine (6).

[0018] The washing appliance (1) of the invention is a washing machine or a washing machine with drying function adapted to execute the methods of the embodiments disclosed hereinafter.

[0019] A method for later load adding to a washing appliance (1), executed by the

control unit (8) by using the washing appliance (1) of the invention, comprises the steps of

- detecting a command from the load addition button (7),
- halting the engine (6) rotating the drum (4),
- unlocking the lock (3) of the door (2),
- querying whether the door (2) is opened throughout a predetermined duration,
- if the door (2) is not opened throughout the predetermined duration, then
    - locking the lock (3) of the door (2),
    - rotating the drum (4) by operating the engine (6) for a given duration to impregnate water to the laundry items (C) in the drum (4), and
    - unlocking the lock (3) of the door (2) again.

[0020] Said steps are explained in detail hereinafter.

[0021] After placing the laundry items (C) into the washing appliance (1), the door (2) of the washing appliance (1) is closed and a button (e.g. a start/pause button) assigned to activate the washing appliance (1) is pressed. Upon pressing said button, the control unit (8) provided in the washing appliance (1) activates the lock (3) to lock the door (2). Thus, the water therein is prevented from overflowing out due to opening of the door (2) during washing.

[0022] Next, the control unit (8) opens a valve provided in the washing appliance (1) to feed water into the drum (4), enabling transmitting water into the drum (4). The control unit (8) automatically closes said valve after filling the drum (4) with water for a predetermined duration. The level of the water filled into the drum (4) is the second level (H2) in which water would overflow of the door (2) when the door (2) is opened.

[0023] Next, the control unit (8) operates an electric engine (6), enabling rotating the drum (4). As a result the drum (4) being rotated for a given duration, the laundry items (C) in the drum (4) absorb the water in the drum (4). Thus, the water level in the drum (4) drops from the second level (H2) to the first level (H1) in which the water would not overflow when the door (2)

is opened.

[0024] In order to add laundry items (C) into the drum (4) after activation of the washing appliance (1), the user presses a load addition button (7) provided on the washing appliance (1), to which load adding function is assigned. In an embodiment of the invention, said button is a start/pause button, and in another embodiment of the invention, it is a separate button other than the start/pause button.

[0025] When the user presses the load addition button (7), the control unit (8) detects this command, halts the engine (6) and unlocks the lock (3) to enable the door (2) of the washing appliance (1) to be opened. When the engine (6) is stopped, since a major portion of the water transmitted into the drum (4) is absorbed by the laundry items (C), the water level in the drum (4) is at the first level (H1). The user can thus open the door (2) and add laundry items (C) into the drum (4) in a safe manner (without water overflowing out of the door (2)). After closing said door (2), washing of the laundry items (C) resumes until the load addition button (7) is pressed again or until the washing process is completed.

[0026] However, if the user does not open the door (2) throughout a predetermined duration, the laundry items (C) in the drum (4) release the water thereon into the drum (4) over time. Therefore, the water in the drum (4) raises to the second level (H2) in which the water would overflow out of the door when the door (2) is opened. To avoid this, the control unit (8) queries whether the door (2) is opened throughout a predetermined duration, and if the door (2) is not opened, it operates the engine (6) for a given duration to impregnate the laundry items (C) with water by rotating the drum again. The water level in the drum (4) is thus enabled to drop below the second level (H2). After the water level decreases to the first level (H1), the control unit (8) unlocks the lock (3) of the door (2), and allows the user to add laundry items (C) into the drum (4) again.

[0027] In another embodiment of the invention, if the washing appliance (1) comprises a jet system, said jet system may enable the water level which has reached the second level (H2) to be dropped so as to compensate the raising of the water level before the user opens the door. For this, in case

the user presses the load addition button (7) but does not open the door (2) throughout a given duration, the control unit (8) operates the engine (6), and then operates a jet pump (10) provided in said jet system. Said jet pump (10) is connected to a jet line (9) which enables the water in the tub (5) during washing to be drawn and sprayed back on the laundry items (C). The washing water sprayed on the laundry items (C) while the drum (4) is being rotated by the engine (6), is easily absorbed by the laundry items (C) by contacting all surfaces thereof.

Claims

1. A method enabling later load adding into a washing appliance (1) comprising a door (2), a lock (3) to lock the door (2), a drum (4) to place laundry items (C) therein, a tub (5) for the drum (4) to move therein, an engine (6) to rotate the drum (4), a load addition button (7), and a control unit (8) connected to said load addition button (7), lock (3) and the engine (6), characterized by the steps of
   - detecting by the control unit (8) a command from the load addition button (7),
   - halting the engine (6) rotating the drum (4),
   - unlocking the lock (3) of the door (2),
   - querying whether the door (2) is opened throughout a predetermined duration,
   - if the door (2) is not opened throughout the predetermined duration, then
   - locking the lock (3) of the door (2),
   - rotating the drum (4) by operating the engine (6) for a given duration to impregnate water to the laundry items (C) in the drum (4), and
   - unlocking the lock (3) of the door (2) again.
2. A method according to claim 1, **characterized by** the step of spraying the water in the tub (5) on the laundry items (C) in the drum (4) by operating a jet pump (10) connected to a jet line (9) extending between the tub (5) and the drum (4), following the step of "rotating the drum (4) by operating the engine (6) for a given duration to impregnate water to the laundry items (C) in the drum (4)."
3. A method according to claim 1 or 2, **characterized by** returning to the step of querying whether the door (2) is opened throughout a predetermined duration, following the step of "unlocking the lock (3) of the door (2) again."
4. A washing appliance (1) which is a washing machine executing a method according to any one of the claims 1 to 3.
5. A washing appliance (1) which is a washing machine with drying function, executing a method according to any one of the claims 1 to 3.

Figure 1

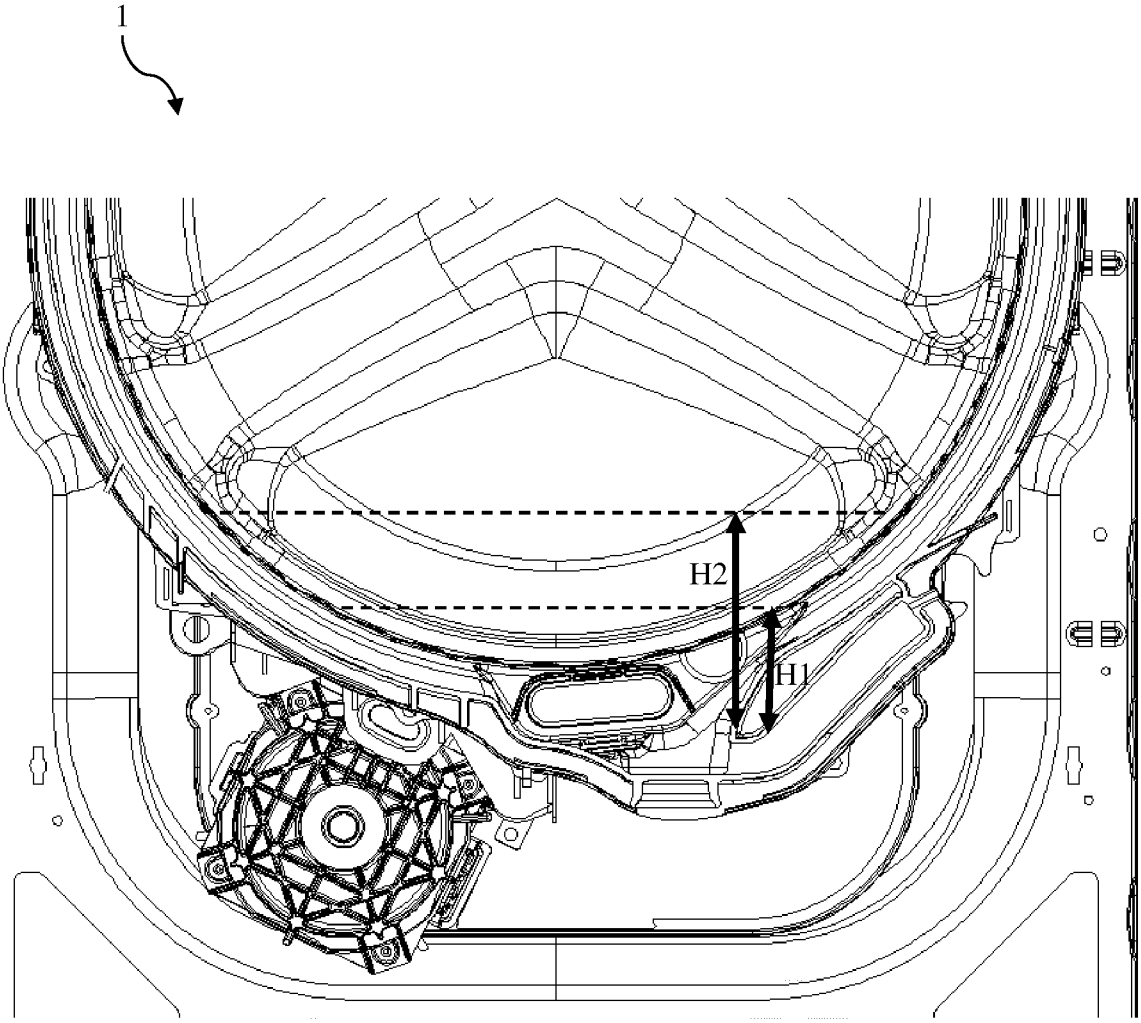


Figure 2

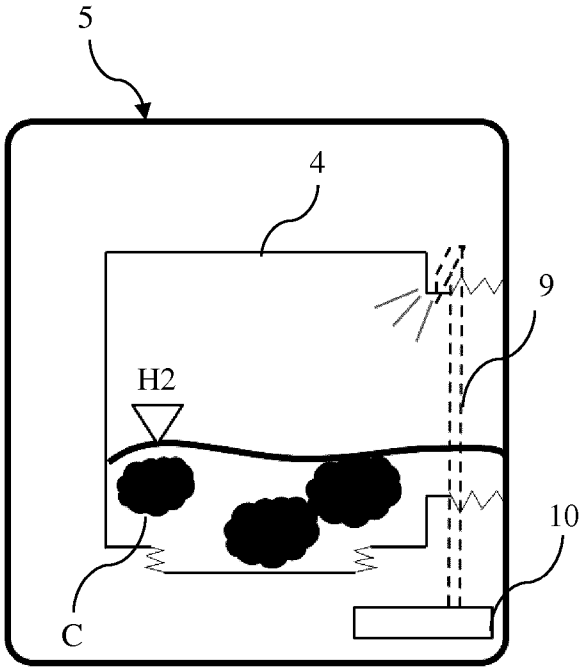


Figure 3

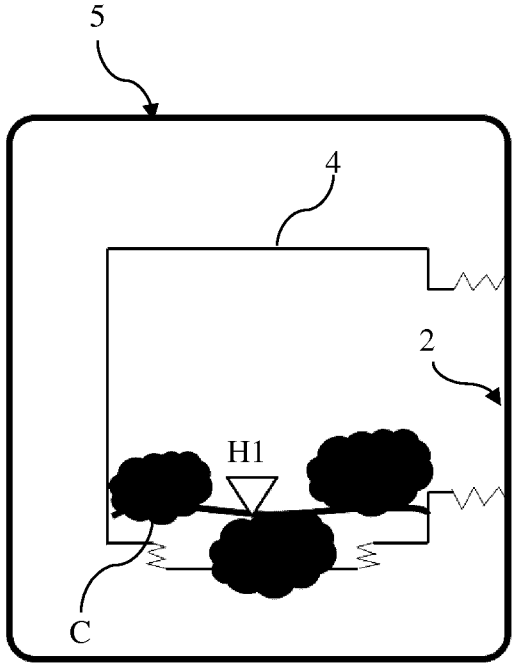


Figure 4

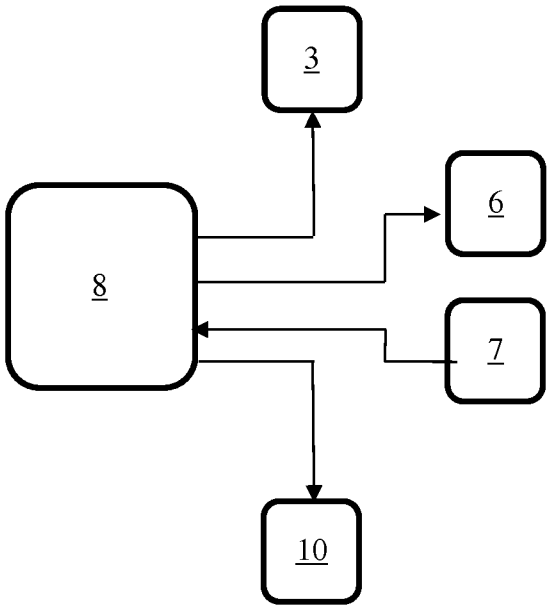


Figure 5

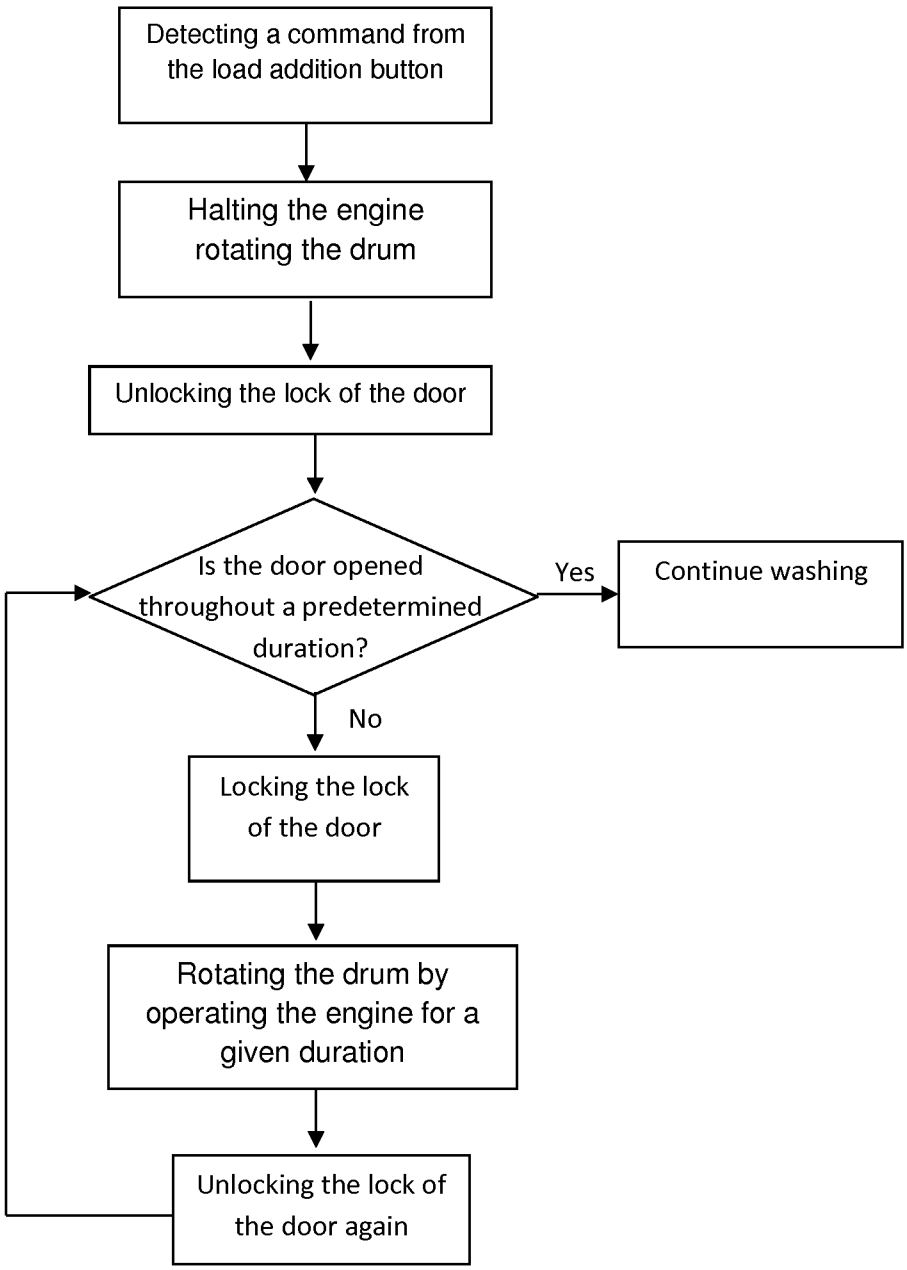
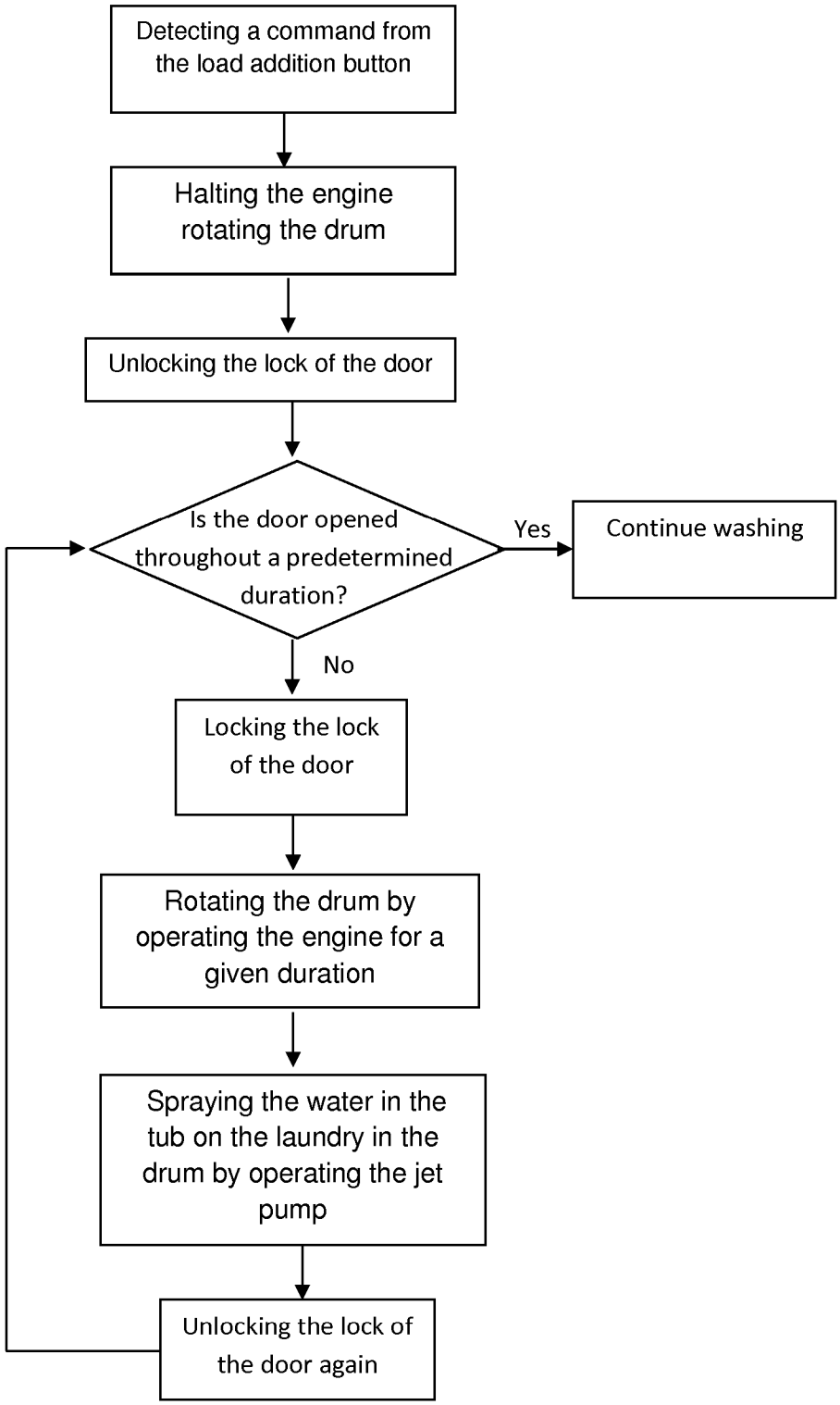

Detecting a command from the load addition button
Halting the engine rotating the drum
Unlocking the lock of the door
Is the door opened throughout a predetermined duration?
Yes
Continue washing
No
Locking the lock of the door
Rotating the drum by operating the engine for a given duration
Unlocking the lock of the door again

Figure 6


Detecting a command from the load addition button
Halting the engine rotating the drum
Unlocking the lock of the door
Is the door opened throughout a predetermined duration?
Yes
Continue washing
No
Locking the lock of the door
Rotating the drum by operating the engine for a given duration
Spraying the water in the tub on the laundry in the drum by operating the jet pump
Unlocking the lock of the door again

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/086868

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F37/42 D06F33/02
ADD.

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

B. FIELDS SEARCHED

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

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 662 036 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 31 May 2006 (2006-05-31) paragraphs [0027], [0030] - [0038]; figures 3,4	1,4,5
A	US 2004/107509 A1 (KIM GON [KR] ET AL) 10 June 2004 (2004-06-10) paragraphs [0038] - [0040]; figure 3	1,4
A	WO 03/029548 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 10 April 2003 (2003-04-10) claims 1,8	1,4
A	WO 2015/078052 A1 (WUXI LITTLE SWAN CO LTD [CN]) 4 June 2015 (2015-06-04) abstract	1,4

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
15 February 2019	01/03/2019

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/086868

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