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

(11) EP 2 966 212 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.01.2016 Bulletin 2016/02

(51) Int Cl.:
D06F 37/06 *(2006.01)* *D06F 37/14* *(2006.01)*

(21) Application number: **15168174.9**

(22) Date of filing: **19.05.2015**

(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:
MA

(30) Priority: **09.07.2014 KR 20140086172**

(71) Applicant: **Dongbu Daewoo Electronics Corporation**
Seoul 135-523 (KR)

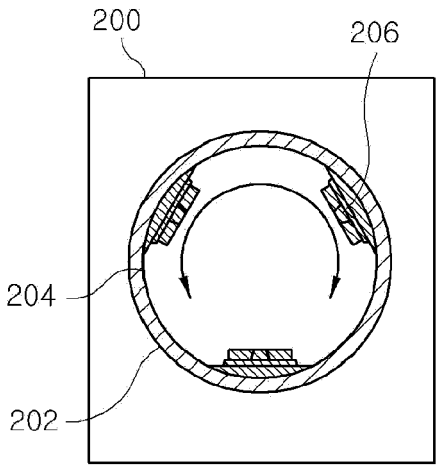
(72) Inventor: **KIM, In Dong**
135-523 Seoul (KR)

(74) Representative: **Rau, Schneck & Hübner Patentanwälte Rechtsanwälte PartGmbB**
Königstraße 2
90402 Nürnberg (DE)

(54) **WASHING MACHINE AND WASHING METHOD THEREOF**

(57) A washing machine includes: an outer tank (202) configured to contain washing water; a rotatable inner tank (204) installed inside the outer tank (202); and an auxiliary washing device (206) installed in the inner tank (204), wherein the auxiliary washing device (206) comprises a rotation body (302) configured to rotate according and relative to the the inner tank (204).

FIG. 2



EP 2 966 212 A1

Description

Cross-Reference to Related Application

[0001] This application is based on and claims priority to Korean Patent Application No. 2014-0086172, filed on July 9, 2014, the disclosure of which is incorporated herein in its entirety by reference.

Field

[0002] Embodiments according to the present disclosure relate to washing machines, and more particularly, to washing machines and washing methods using such machines. In an embodiment, the washing machines improve cleaning by rubbing items of laundry together using friction generated while the laundry passes through a rotation body of a lifter that is installed inside the drum of the washing machine. The lifter also functions to move the laundry and washing water. In an embodiment, the lifter includes a support body which is fixed length-wise in the horizontal direction inside the drum, and a rotation body that is connected to an axis extending from the support body and that rotates about the axis according to the rotation of a drum.

Background

[0003] In general, a washing machine is an item of equipment that cleans laundry such as clothes by rotating water and detergent in a tub. Washing machines can be categorized as either vertical washing machines (or pulsator washing machines) or drum washing machines based on the orientation of the tub in which the laundry is placed. A drum washing machine has a drum whose axis of rotation is horizontal. Laundry is placed inside the drum, is moved vertically (up and down) by the rotation of the drum, and is cleaned while moving.

[0004] FIG. 1 is a cross-sectional view of a conventional drum washing machine.

[0005] Referring to FIG. 1, the drum washing machine includes a cabinet 100 which has an opening at the front side, a tub 102 which is installed inside the cabinet to contain washing water, and a rotatable drum 104 which is installed inside the tub 102 to contain the laundry, detergent, etc.

[0006] The drum 104 has a front opening as in the cabinet 100 and the tub 102, and a motor at the back of the tub is installed outside the drum. Accordingly, once the motor operates, the drum 104 produces a washing action by rotating around the horizontal axis.

[0007] Lifters 106 protruding toward the center of the drum are installed on the inside wall of the drum 104 and help improve washing effectiveness by lifting the laundry while the drum rotates to increase movement of the laundry.

[0008] In general, such lifters 106 are installed length-wise in the horizontal direction on the inside wall of the drum 104 and protrude towards the center of rotation. Therefore, while the drum 104 rotates, the lifters assist the process of washing the laundry, by increasing movement of the laundry and washing water by lifting the laundry and scooping the washing water from the bottom of the drum 104 to the top.

[0009] However, the lifters 106 included with conventional drum washing machines are immobile and are only installed on the inside of the drum 104; as a result, they only function to scoop the washing water and the laundry and therefore limit washing effectiveness.

Summary

[0010] In view of the above, therefore, embodiments according to the present invention provide a drum washing machine and a method of washing using such a washing machine, which improve washing force and effectiveness by causing items of laundry to rub against each other using friction generated when the laundry passes through a rotation body of a lifter that is installed inside the drum of the washing machine. The lifter performs an auxiliary function of moving the laundry and washing water. In an embodiment, the lifter includes a support body that is attached length-wise in the horizontal direction inside the drum, and a rotation body connected to an axis extending from the support body and that rotates according to the rotation of a drum.

[0011] In an embodiment according to the invention, a washing machine includes: an outer tank configured to contain washing water; a rotatable inner tank installed inside the outer tank; and an auxiliary washing device installed in the inner tank, where the washing auxiliary device includes a rotation body configured to rotate according to and relative to the rotation of the inner tank.

[0012] In an embodiment, the washing auxiliary device includes a support body, and the rotation body is connected to an axis that extends from the support body and rotates according to the rotation of the inner tank.

[0013] In an embodiment, the support body is installed inside the inner tank length-wise in the horizontal direction and protrudes towards the center of the inner tank.

[0014] In an embodiment, the rotation body includes a panel or base (e.g., a round base) of a predetermined thickness, a connecting groove configured to be connected to the axis of rotation at the bottom middle of the base, and a protrusion protruding a predetermined constant height from the top of the base.

[0015] In an embodiment, the rotation body includes two or more equally spaced bases.

[0016] In an embodiment, the protrusion has the shape of a cross; in another embodiment, it has a linear shape.

[0017] In an embodiment, the axis of the rotation body rotates freely without power according to the rotation of the inner tank. In another embodiment, it rotates using rotational motive power delivered from a motor located outside the inner tank.

[0018] In another embodiment according to the inven-

tion, a method of washing includes: rotating an inner tank of a washing machine; and rotating a rotation body attached to the inner tank, where items of laundry contact the rotation body and are rubbed against each other by the movement of the rotation body, and are lifted by the rotation body to the top of the inner tank.

[0019] In embodiments according to the present disclosure, washing force and effectiveness in the washing machine is improved by making items of laundry rub against each other using friction generated when the laundry passes through a rotation body of a lifter that is installed inside the drum of the washing machine. The lifter performs an auxiliary function of moving the laundry and washing water. The lifter includes a support body which is fixed length-wise in the horizontal direction inside the drum, and a rotation body connected to an axis extending from the support body and rotating according to and relative to the rotation of the drum. Also, further improvements in washing force and effectiveness are expected as a result of the impact on the laundry of protrusions formed on the rotation body.

Brief Description of the Drawings

[0020]

FIG. 1 is a cross-sectional view of a conventional drum washing machine.

FIG. 2 is a cross-sectional view of a drum washing machine equipped with a rotatable lifter in an embodiment according to the present disclosure.

FIGs. 3A and 3B illustrate a plan view and a cross-sectional view of a lifter in an embodiment according to the present disclosure.

FIG. 4 is an illustration of a rotatable lifter in operation in an embodiment according to the present disclosure.

FIG. 5 is a flowchart of an example of a method of washing in an embodiment according to the present disclosure.

Detailed Description

[0021] Hereinafter, embodiments according to the present invention will be described in detail with reference to the accompanying drawings.

[0022] In the following description, well-known functions or components will not be described in detail to avoid unnecessarily obscuring aspects of the present invention.

[0023] FIG. 2 illustrates a cross-sectional view of a drum washing machine equipped with rotatable lifters in an embodiment according to the present disclosure. Hereinafter, embodiments according to the present disclosure are described in more detail with reference to the example of FIG. 2.

[0024] Referring to FIG. 2, the drum washing machine includes a cabinet 200 which has an opening at the front side, an outer tank 202 which is installed inside the opening to contain washing water, e.g., a tub and a rotatable inner tank 204 which is installed inside the tub 202 to contain laundry and detergent, e.g., a rotatable inner drum.

[0025] A lifter 206, also referred to herein as an auxiliary washing device, is installed on the inside wall of the drum 204 to improve washing effectiveness. As known in the art, a lifter is installed inside the drum length-wise in the horizontal direction to improve washing effectiveness by scooping and dropping the washing water and/or the laundry while the drum rotates; however, as described above, washing effectiveness is limited because the conventional lifter is immobile inside the drum (it is attached to the drum in a manner such that it cannot move relative to the drum).

[0026] In the present disclosure, the lifter 206, an auxiliary washing device, is configured to be rotatable as shown in FIG. 3A, which is different from the conventional fixed lifter.

[0027] That is, the lifter 206 of the present disclosure, as illustrated in FIGs. 3A and 3B, is connected to a support body 300 inside the drum 204 and to a rotation axis (not shown) that extends from the support body 300; therefore, the lifter 206 includes a rotation body 302 that can rotate around the rotation axis according to the rotation of the drum 204. That is, the lifter 206 can move (rotate) relative to the drum 204 about its axis of rotation while the drum is rotating about its axis of rotation.

[0028] One or more support bodies 300 are installed length-wise in the horizontal direction inside the drum 204 (that is, each support body 300 is essentially parallel to the axis of rotation of the drum). In an embodiment, each support body 300 is installed at a constant distance from the center of the drum 204. In an embodiment, the support bodies 300 are installed at equal distances from each other on the drum 204; that is, they are evenly spaced along the circumference of the inside of the drum. In an embodiment, the rotation body 302 includes a round-shaped base of predetermined thickness. In an embodiment, the rotation body 302 includes a protruding element 304 which extends from the base to a predetermined height. The purpose of the protruding element 304 is described below. In an embodiment, the bottom middle portion of the rotation body 302 includes a connecting groove (not shown), which may be connected to the axis that extends from the support body 300 and that is mentioned above.

[0029] The lifter 206, with components such as those described above, may include one or more rotation bodies 302, as in the examples of FIGs. 3A and 3B. In an embodiment, the rotation bodies 302 are equally spaced on the support bodies 300. When the drum 204 is rotating, the rotation body 302 also rotates according to the rotation of the drum 204 and as a result, the lifter 206 scrubs the laundry in addition to performing its conventional function of lifting the washing water to the top of the drum 204.

[0030] Also, in an embodiment, the rotation body 302 is connected to its axis of rotation (an axis extending from the support body 300) without power, and therefore it rotates freely in response to the force exerted on it by the washing water. Accordingly, it can apply friction to laundry located next to and/or between the rotation bodies 302 using centrifugal force generated by the rotation of the rotation bodies. In another embodiment, the rotation body 302 is connected to its axis of rotation (which extends from the support body 300), and that axis is connected to a motor. In such an embodiment, rotation of the rotation body 302 is controlled by the motor, and it rotates about the axis and applies friction to the laundry located next to and/or between the rotation bodies.

[0031] FIG. 4 is a diagram illustrating the lifter 206 in operation in an embodiment according to the present disclosure. As shown in FIG. 4, the laundry may pass through (between) the rotation bodies 302 of the lifter 206 in the direction of the rotation of the drum 204.

[0032] As mentioned above, the rotation body 302 of the lifter 206 may rotate either freely in a direction around its axis of rotation (extending from the support body 300) or in a specific direction using rotational motive power in an embodiment in which a motor is connected to the rotation body 302 outside the drum 204.

[0033] In either case, the laundry located between the rotation bodies 302 is drawn from the outside of the rotation bodies 302 by the rotation of the rotation bodies 302 and is forced to pass through the narrow space between the rotation bodies 302. A washing operation such as scrubbing happens because of the friction generated in the process of the laundry passing through that narrow space.

[0034] Accordingly, when compared to typical lifters with which washing is performed only by lifting and dropping the laundry, embodiments according to the present disclosure improve washing force and effectiveness and can consequently reduce the washing time, because of the rotation of the rotation body on the lifters that makes it possible to scrub the laundry.

[0035] Moreover, rotation bodies according to the present disclosure, such as shown in FIG. 2, can have protrusions 304 that have various shapes. The protrusions 304 may be formed, for example, in a cross or linear shape, but are not limited to these shapes.

[0036] The protrusions 304 apply regular force to the laundry drawn between the rotation bodies 302 according to the rotation speed of the rotation bodies 302, and they also help draw laundry in between the rotation bodies 302 because of the rotation of the rotation bodies 302.

[0037] Therefore, washing force and effectiveness improve through the laundry being impacted by the rotation bodies 302 including the rotatable base with the protrusions 304, and/or by scrubbing as described above.

[0038] FIG. 5 is a flowchart 500 of an example of a method of washing in an embodiment according to the present disclosure. The method of FIG. 5 is implemented using a washing machine such as that described above.

[0039] In block 502, an inner tank of a washing machine is rotated.

[0040] In block 504, a rotation body attached to the inner tank is rotated. The rotation body rotates relative to the rotation of the inner tank. Items of laundry in the inner tank contact the rotation body and are caused to be rubbed against each other by the movement of the rotation body. The rotation body causes the laundry to be lifted to the top of the inner tank as the inner tank rotates.

[0041] As mentioned above, according to the present disclosure, the washing force and effectiveness in a washing machine can be improved by causing items of laundry to rub against each other using friction generated while the laundry passes through a rotation body of a lifter that is installed inside the drum of the washing machine. The lifter performs an auxiliary function to move the laundry and the washing water. In embodiments according to the present disclosure, the lifter includes a support body that is fixed length-wise in the horizontal direction inside the drum, and a rotation body that is connected to an axis extending from the support body and rotating according to the rotation of a drum. Also, additional washing force and effectiveness can be expected using various shapes of protrusions formed in or on the upper part of the rotation body and that impact laundry during washing.

[0042] The foregoing description, for purpose of explanation, has been described with reference to specific embodiments. However, the illustrative discussions above are not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as may be suited to the particular use contemplated.

[0043] Embodiments according to the invention are thus described. While the present disclosure has been described in particular embodiments, it should be appreciated that the invention should not be construed as limited by such embodiments, but rather construed according to the below claims.

Claims

1. A washing machine, comprising:

an outer tank configured to contain washing water;

a rotatable inner tank inside the outer tank; and

an auxiliary washing device on the inner tank, wherein the auxiliary washing device comprises a rotation body configured to rotate according and relative to the inner tank.

2. The washing machine of claim 1, wherein the auxiliary washing device further comprises a support body, wherein the rotation body is coupled to an axis extending from the support body and rotates according to the rotation of the inner tank.

3. The washing machine of claim 2, wherein the support body is installed inside the inner tank length-wise in the horizontal direction and protrudes toward the center of the inner tank.

4. The washing machine of claim 2, wherein the axis rotates freely without power according to the rotation of the inner tank.

5. The washing machine of claim 2, wherein the axis rotates using power delivered from a motor located outside the inner tank.

6. The washing machine of claim 1, wherein the rotation body comprises a base and a protrusion protruding from the base.

7. The washing machine of claim 6, wherein two or more panels are formed on the support body.

8. The washing machine of claim 6, wherein the protrusion has a shaped selected from the group consisting of: a cross; and a linear shape.

9. A method of washing, comprising:

rotating an inner tank of a washing machine; and rotating a rotation body coupled to the inner tank, wherein the rotation body rotates relative to the rotation of the inner tank, wherein items of laundry in the inner tank contact the rotation body and are caused to be rubbed against each other by the movement of the rotation body; and wherein the rotation body causes the laundry to be lifted to the top of the inner tank as the inner tank rotates.

10. The method of claim 9, wherein the auxiliary washing device further comprises a support body, wherein the rotation body is coupled to a support body and to an axis extending from the support body, and rotates according to the rotation of the inner tank.

11. The method of claim 10, wherein the support body is installed inside the inner tank length-wise in the horizontal direction and protrudes toward the center of the inner tank.

12. The method of claim 10, wherein the axis rotates freely without power according to the rotation of the inner tank.

13. The method of claim 10, wherein the axis rotates using power delivered from a motor located outside the inner tank.

14. The method of claim 9, wherein the rotation body comprises a panel and a protrusion protruding from the panel.

FIG. 1

(PRIOR ART)

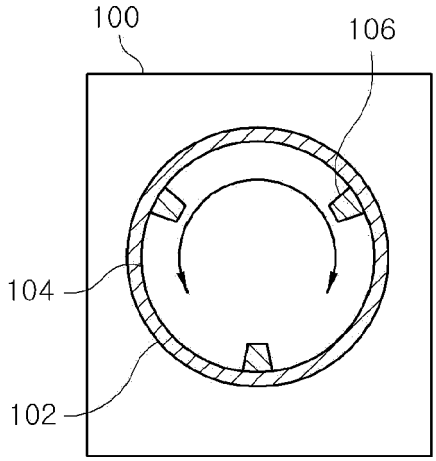


FIG. 2

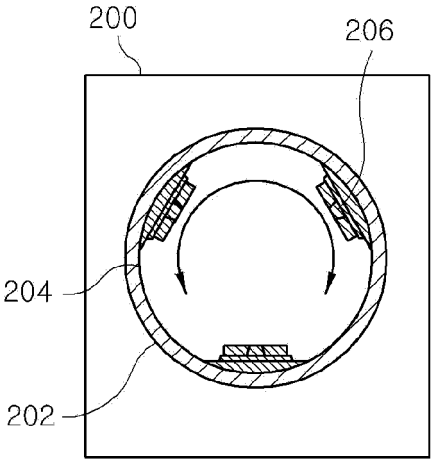


FIG. 3A

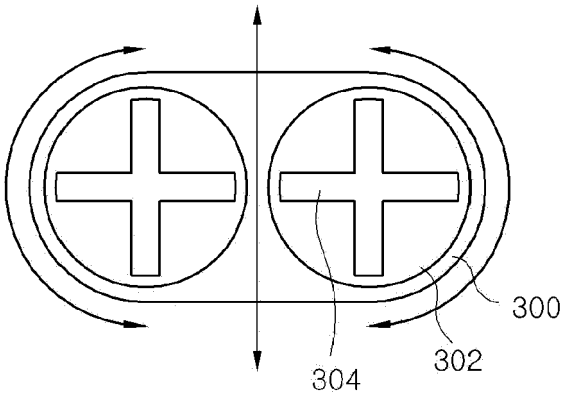


FIG. 3B

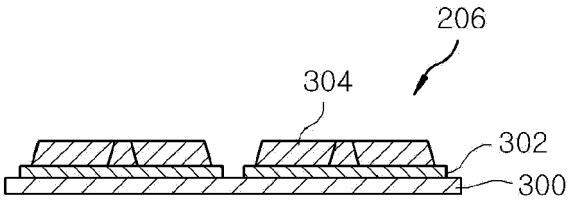


FIG. 4

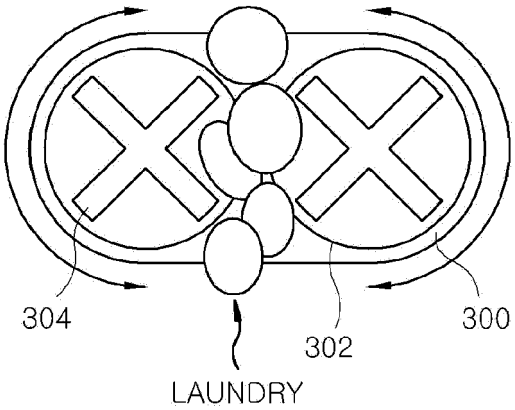
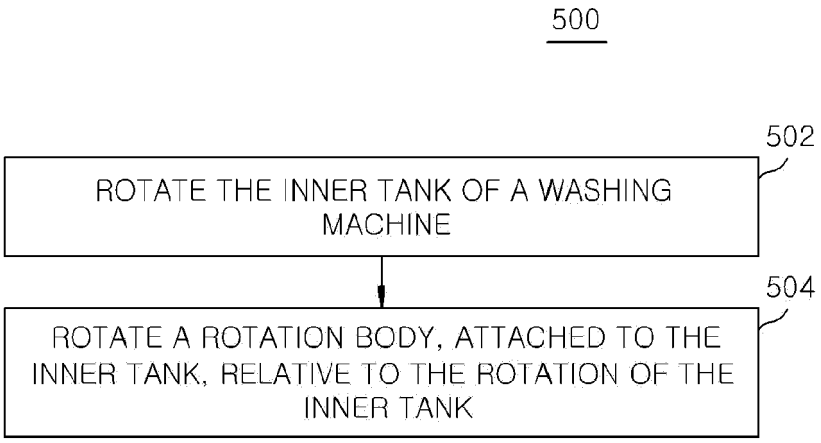


FIG.5


500
502
ROTATE THE INNER TANK OF A WASHING MACHINE
504
ROTATE A ROTATION BODY, ATTACHED TO THE INNER TANK, RELATIVE TO THE ROTATION OF THE INNER TANK

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 16 8174

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	KR 2013 0123543 A (DONGBU DAEWOO ELECTRONICS CORP [KR]) 13 November 2013 (2013-11-13) * the whole document *	1-4,6,7, 9-12,14	INV. D06F37/06 ADD. D06F37/14
X	WO 2014/102361 A1 (ARCELIK AS [TR]; HARTOKA ONUR [TR]; SAHIN YAVUZ [TR]; KAYA MEHMET [TR]) 3 July 2014 (2014-07-03) * paragraph [0007] * * paragraphs [0021] - [0029] * * figure 1 *	1-4,9-12	
X	KR 2014 0084951 A (DONGBU DAEWOO ELECTRONICS CORP [KR]) 7 July 2014 (2014-07-07) * the whole document *	1-4,6, 9-12,14	
X	US 5 950 460 A (OH OCK-HWAN [KR]) 14 September 1999 (1999-09-14) * column 3, line 56 - column 5, line 19 * * figures 1-3 *	1,2,4-6, 8-10, 12-14	

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	26 November 2015	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 15 16 8174

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.

26-11-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 20130123543 A	13-11-2013	NONE	
WO 2014102361 A1	03-07-2014	NONE	
KR 20140084951 A	07-07-2014	NONE	
US 5950460 A	14-09-1999	CN 1200416 A	02-12-1998
		JP H10328469 A	15-12-1998
		US 5950460 A	14-09-1999

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

- KR 20140086172 **[0001]**