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(71) Applicant (for all designated States except US): BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH [DE/DE]; Carl-Wery-Str. 34, 81739 München (DE).

(72) Inventors; and

(71) Applicants (for US only): TANG, Huijun [CN/CN]; No.61 Chunjiang Garden, 702 room, Wuxi city, Jiangsu 2140000 (CN). CHEN, Aibin [CN/CN]; No. 66 Wang-zhuang Road, Wuxi, Jiangsu 214028 (CN). XIE, Jun [CN/CN]; Room 301, NO.755 C kuai, Wu xing jia yuan, WuXi, Jiangsu 214028 (CN).

(74) Common Representative: BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH; Postfach 83 01 01, 81701 München (DE).

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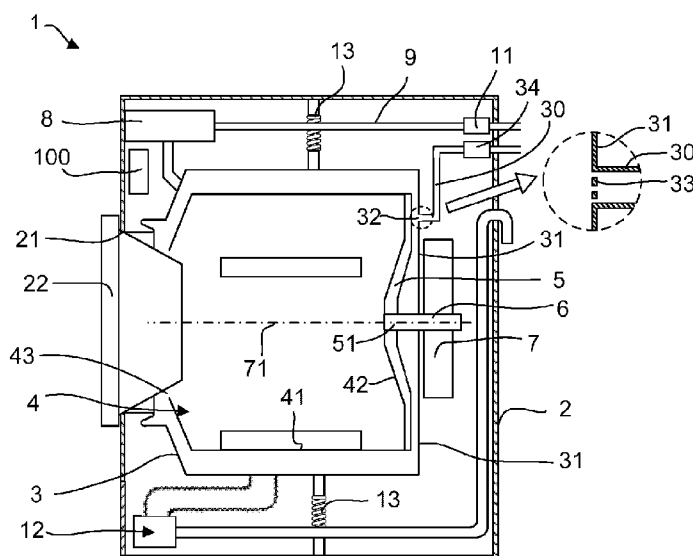


FIG. 1

(57) Abstract: The invention relates to a drum washing machine (1) having a drum assembly, where the drum assembly includes a tub (3) and a drum (4) mounted inside the tub (3), the drum (4) is driven by a motor (7) to rotate about a rotating shaft (71). The drum (4) has an approximately cylinder-shaped side wall (41) and an end wall (42) located at an end of the side wall (41), the end wall (42) is fixedly connected to a mounting bracket (5); a transmission shaft (6) passing through the tub wall (31) has one end fixed to the mounting bracket (5) and the other end connected to the motor (7); the tub wall (31) is mounted with a water pipe (30), and a water outlet (32) of the water pipe (30) faces the end wall (42) and the mounting bracket (5). Water may flow out from the water pipe (30), and rush to the end wall (42) and the mounting bracket (5) for cleaning the end wall (42) and the mounting bracket (5). At the same time, because the distances from the tub wall (31) to the end wall (42) and the mounting bracket are generally short, after the water rushing to the end wall (42) and the mounting bracket (5) splashes, the tub wall (31) may be washed.

DRUM WASHING MACHINE HAVING A DRUM ASSEMBLY

The present invention relates to a drum washing machine having a drum assembly, where the drum assembly includes a tub and a drum mounted inside the tub, the drum is driven by a motor to rotate about a rotating shaft, the drum has an approximately drum-shaped side wall and an end wall located at an end of the side wall, the end wall is fixedly connected to a mounting bracket, and a transmission shaft passing through a tub wall has one end fixed to the mounting bracket, and the other end connected to the motor. The present invention particularly relates to a drum washing machine having a self-cleaning drum assembly.

Existing washing machines include top-loading pulsator washing machines and drum washing machines having a drum that rotates about a horizontal shaft or an inclination shaft. A drum washing machine generally includes a drum for containing laundry, a tub disposed around the drum and a motor that drives the drum to rotate. The drum has an approximately drum-shaped side wall and an end wall located at an end of the side wall. To implement transmission and connection with the motor, outside of the end wall of the drum is generally connected to a mounting bracket, and a transmission shaft passing through the tub wall has one end fixed to the mounting bracket and the other end connected to the motor, thereby making the motor drive the drum.

For the drum washing machine having the drum rotating about a horizontal shaft or an inclination shaft, to protect the environment and save water, a rinsing water level is generally set low. Especially when clothes to be washed are few, the water level is even less than 1/3 the diameter of the mounting bracket. Therefore, after rinsing, washing powder that has not melted completely splashed in the washing process and dirt and lint remaining after bubbles burst will be adhered to the mounting bracket close to the nearby of a main shaft, causing secondary pollution for clothes in next washing. Sometimes the mounting bracket even cracks due to continuous corrosion of detergent that is not rinsed clean. Similarly, because the rinsing water level is low, outside of the end wall of the drum and the corresponding inner wall of the tub will have residual detergent and lint that are not washed away by the rinsing water. For the pulsator washing machine, an inner barrel and an outer barrel are disposed vertically, and the bottom of the inner barrel is generally

submerged in washing water or rinsing water, so the above problems will not occur.

One objective of the present invention is to avoid or decrease secondary pollution of laundry caused by filth remaining on a drum assembly and a mounting bracket, and at the same time prolong the working life of the mounting bracket.

To achieve the objective, a technical solution adopted in the present invention is a drum washing machine as defined in the attached independent claim. Preferred embodiments of the invention are subjects of dependent claims as attached, and of the subsequent disclosure and the attached drawing.

According to the invention, a drum washing machine having a drum assembly, where the drum assembly includes a tub and a drum mounted inside the tub, the drum is driven by a motor to rotate about a rotating shaft, the drum has an approximately cylinder-shaped side wall and an end wall located at an end of the side wall, the end wall is fixedly connected to a mounting bracket, a transmission shaft passing through the tub wall has one end fixed to the mounting bracket and the other end connected to the motor, the tub wall is mounted with a water pipe, and a water outlet of the water pipe faces the end wall of the drum and the mounting bracket.

Through the water pipe mounted on the tub wall, water may flow out from the water pipe, and rush to the end wall of the drum and the mounting bracket. At the same time, because the distances from the tub wall to the end wall of the drum and the mounting bracket are generally close, after the water rushing to the end wall of the drum and the mounting bracket splashes, the tub wall may be washed. Therefore, washing of the end wall of the drum, the tub wall and the mounting bracket is implemented, and problems caused by filth, such as washing powder, dirt that remains after bubbles burst and lint, residues in these components as described in the background of the invention are solved.

Preferably, a water outlet of the water pipe is disposed with several ribs for dividing a water flow into several water columns. Through this structure, the water flow is more dispersed, the washing range is larger and the speed of the water flow is also relatively fast, thereby improving the washing effect.

Preferably, the rotating shaft is approximately horizontal or has an angle of inclination less than 90 degrees with respect to a horizontal plane.

Preferably, the water outlet of the water pipe is located above a horizontal plane
5 where a center of the mounting bracket locates. Water flowing out from the water pipe sprays on the end wall of the drum, the tub wall and the mounting bracket from top to bottom under the effect of gravity, which has a good washing effect, and at the same time the washing range is large.

10 Preferably, the water outlet of the water pipe is located right above the center of the mounting bracket, so after falling down, in a concentrated manner, the water flow sprays on a central position of the mounting bracket that gathers dirt most easily, thereby achieving a good washing effect.

15 Preferably, the distance from the water outlet of the water pipe to the center of the mounting bracket is about $1/6$ the diameter of the mounting bracket. The height of $1/3$ the diameter of the mounting bracket is generally submerged in rinsing water, and therefore the range of $1/6$ diameter from the center needs to be washed. The setting may achieve more concentrated washing, thereby improving the washing effect.

20 Preferably, the water pipe is connected to a circulating water tank, and an upstream of the circulating water tank is connected to a drainage device at the bottom of the tub.

25 Preferably, the present invention includes a detergent box, where an upstream thereof is connected to a first water valve through a washing water inlet pipe, so as to be connected to an external water source, and a downstream thereof is connected to the tub, and the water pipe is connected to the detergent box.

30 Preferably, the water pipe is connected to an external water source through a second water valve.

Preferably, the present invention includes a control device for opening the water valve connected to the water pipe during the rotation of the drum, so that the water flow rushes to the end wall of the drum and the mounting bracket through the water pipe, where the

mounting bracket has an arm radiated from a center in a radial direction. When the drum rotates, after rushing to the mounting bracket and the end wall of the drum, the sprayed water will slip down to clean the mounting bracket and the end wall of the drum, and at the same time, the water splashed from the mounting bracket and the end wall of the drum will wash the tub wall. Thus, the rotating drum and the mounting bracket fixedly thereon may be cleaned sufficiently. At the same time, the mounting bracket and the drum rotate together, a radial arm on the mounting bracket slaps the water flow in the rotation process, and the splashed water strikes the end wall of the drum, the mounting bracket and the tub wall, which greatly improves the cleaning effect.

Specific implementation manners of the present invention are described below by taking a drum washing machine having a drum rotating horizontally as an example, and with reference to the accompanying drawing. In the drawing,

FIG. 1 is a schematic cross-sectional diagram of a drum washing machine; and

FIG. 2 is a right view of a drum assembly in FIG. 1.

As shown in FIG. 1, a washing machine 1 has a tub 3 suspended in a box 2 through a damping device 13. The tub 3 is disposed with a drum 4. The drum 4 has an approximately cylinder-shaped side wall 41 and an end wall 42 located at an end of the side wall. A laundry receiving hole 43 is disposed in a direction opposite to the end wall 42, which is linked with a laundry loading hole 21 of the box 2. The laundry loading hole 21 is disposed with a door assembly 22 for opening or closing the laundry loading hole 21 and the laundry receiving hole 43. Outside of the end wall 42 of the drum is fixedly connected to a mounting bracket 5. A transmission shaft 6 passing through a tub wall 31 has one end fixed to the mounting bracket 5 and the other end in transmission connection with a motor 7. The drum 4 is driven by the motor 7 to rotate about a horizontal rotating shaft 71. In other implementation manners, the rotating shaft may have an angle of inclination less than 90 degrees with respect to a horizontal plane. The horizontal rotating shaft 71 passes through a center 51 of the mounting bracket 5 and a shaft center of the transmission shaft 6 respectively. An upstream of a detergent box 8 is connected to a first water valve 11 through a washing water inlet pipe 9, so as to be connected to an external water source, and a downstream thereof is connected to the tub 3. The bottom of the tub 3 is connected

to a drainage device 12. Washing water discharged from the tub 3 is discharged from the drainage device 12 to outside of the washing machine 1.

As shown in FIG. 1 and FIG. 2, the mounting bracket 5 has an arm 52 radiated from the center 51 in a radial direction. The tub wall 31 is mounted with a water pipe 30, a water outlet 32 of the water pipe 30 faces the end wall 42 of the drum and the mounting bracket 5, and the water outlet 32 of the water pipe 30 is disposed with several ribs 33 dividing a water flow into several water columns. To achieve a more concentrated and effective washing effect, preferably, the water outlet 32 of the water pipe 30 is located right above the center 51 of the mounting bracket 5, and the distance to the center 51 of the mounting bracket is about 1/6 the diameter of the mounting bracket 5. In other practicable implementation manners, the water outlet 32 of the water pipe 30 may be located at other suitable positions above a horizontal plane where the center 51 of the mounting bracket 5 locates, which still may achieve some washing effect.

To supply water to the water pipe 30, in this embodiment, the water pipe 30 is connected to an external water source through a second water valve 34. By opening the second water valve 34, external tap water enters the tub 3 through the water pipe 30 to wash the end wall 42 of the drum, the mounting bracket 5 and the tub 3.

In other implementation manners, the water pipe 30 may also be connected to the detergent box 8. Another preferable solution is that, the water pipe is connected to a circulating water tank (not shown) through a water valve, and an upstream of the circulating water tank is connected to the drainage device 12 of the bottom of the tub 3. A control device 100 disposed in the washing machine 1 controls the drainage device 12 to collect clean washing water from the circulating water tank, for example, the water discharged after the final rinsing in a washing program, and controls the water valve as required to supply water to the water pipe 30 from the circulating water tank.

The control device 100 controls the water valve 34 connected to the water pipe 30, and makes the water valve open in the process of rotation of the drum 4, so that water flow rushes to the end wall 42 of the drum and the mounting bracket 5 through the water pipe 30. Specifically, the water valve 34 may be opened in the main washing process and/or the rinsing process when the washing machine 1 executes the washing program.

Therefore, the water sprayed from the outlet 32 of the water pipe 30 rushes to the mounting bracket 5 and the end wall 42 of the drum, and slips down to clean the mounting bracket 5 and the end wall 42 of the drum. At the same time, the water splashed from the mounting bracket 5 and the end wall 42 of the drum further washes the tub wall 31 of the tub 3. The radial arm 51 on the mounting bracket 5 slaps the water flow in the rotation process, and the splashed water strikes the end wall 42 of the drum, the mounting bracket 5 and the tub wall 31 of the tub 3, which greatly improves the cleaning effect.

CLAIMS

- 5 1. A drum washing machine (1) having a drum assembly, wherein the drum assembly comprises a tub (3) and a drum (4) mounted inside the tub (3), the drum (4) is driven by a motor (7) to rotate about a rotating shaft (71), the drum (4) has an approximately cylinder-shaped side wall (41) and an end wall (42) located at an end of the side wall (41), the end wall (42) is fixedly connected to a mounting bracket (5), a transmission shaft (6) passing through a tub wall (31) of the tub (3) has one end fixed to the mounting bracket (5), and the other end connected to the motor (7), the tub wall (31) is mounted with a water pipe (30), and a water outlet (32) of the water pipe (30) faces the end wall (42) and the mounting bracket (5).
- 10
- 15 2. The drum washing machine (1) according to claim 1, wherein the water outlet (32) is disposed with several ribs (33) for dividing a flow of water into several columns of water.
- 20 3. The drum washing machine (1) according to claim 1, wherein the rotating shaft (71) is approximately horizontal, or has an angle of inclination less than 90 degrees with respect to a horizontal plane.
- 25 4. The drum washing machine (1) according to claim 3, wherein the water outlet (32) is located above a horizontal plane where a center (51) of the mounting bracket (5) locates.
- 30 5. The drum washing machine (1) according to claim 4, wherein the water outlet (32) is located right above the center (51) of the mounting bracket (5).
6. The drum washing machine (1) according to claim 4, wherein the distance from the water outlet (32) to the center (51) of the mounting bracket is about 1/6 the diameter of the mounting bracket.

7. The drum washing machine (1) according to any one preceding claim, wherein the water pipe (30) is connected with a circulating water tank, and an upstream of the circulating water tank is connected with a drainage device (12) at a bottom of the tub (3).
- 5
8. The drum washing machine (1) according to any preceding claim, comprising a detergent box (8), wherein an upstream thereof is connected with a first water valve (11) through a washing water inlet pipe (9) so as to be connected to an external water source, and a downstream thereof is connected with the tub (3),
- 10 and the water pipe (30) is connected with the detergent box (8).
9. The drum washing machine (1) according to any one of claims 1 to 7, wherein the water pipe (30) is connected to an external water source through a second water valve (34).
- 15
10. The drum washing machine (1) according to claim 1, comprising a control device (100) for opening the water valves (11, 34) connected with the water pipe (30) during the rotation of the drum (4), so that the water flow rushes to the drum end wall (42) and the mounting bracket (5) through the water pipe (30), wherein the mounting bracket (5) has an arm (52) radiated from a center
- 20 in a radial direction.

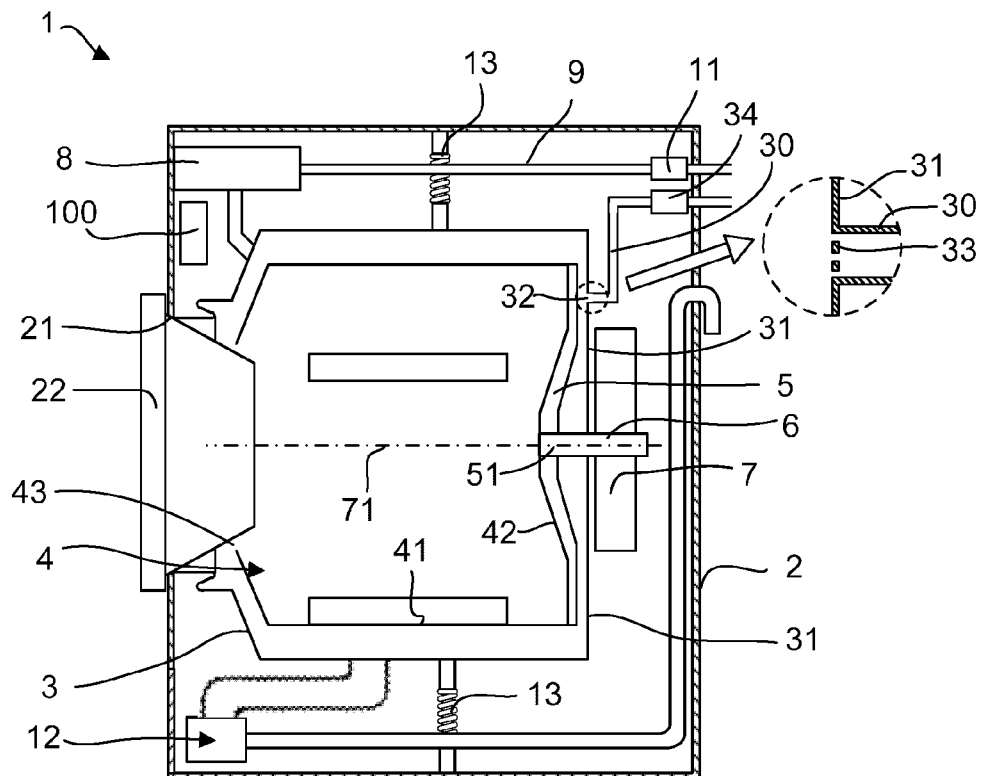


FIG. 1

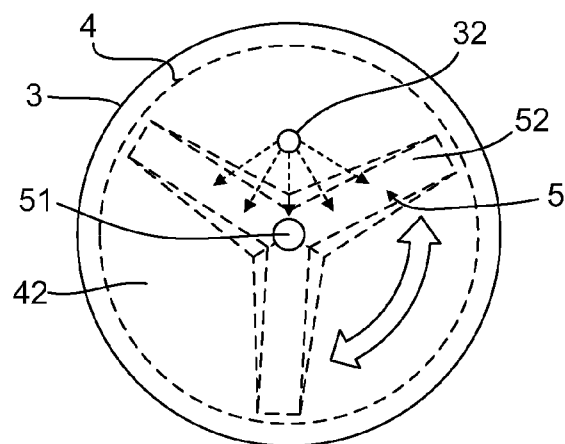


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/075433

A. CLASSIFICATION OF SUBJECT MATTER

INV. D06F37/26

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.
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X	US 2 960 780 A (STI LWELL JR WILLIAM E) 22 November 1960 (1960-11-22) figure 7 -----	1,3
A		2,4-10



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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