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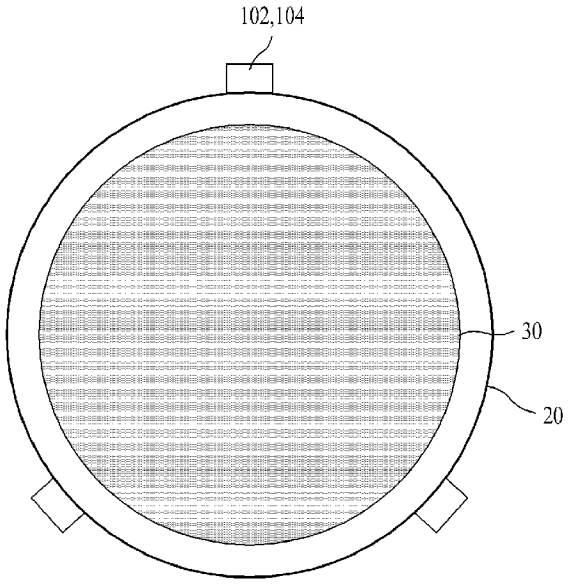
(54) Title: WASHING MACHINE AND CONTROLLING METHOD THEREOF

[Fig. 2]



(57) Abstract: A washing machine and a controlling method of the same are disclosed. A washing machine includes a cabinet (10) defining an exterior appearance thereof, a tub (20) provided in the cabinet (10), the tub (20) receiving wash water therein, a drum (30) rotatable inside the tub (20), the drum (30) receiving laundry therein, a plurality of sensor members (100,102,104,112,116,120,130) installed in at least one of the drum (30) and tub (20), each of the sensor members (100,102,104,112,116,120,130) sensing the distance between the drum (30) and the tub (20), and a control part controlling the drum (30) based on a sensing value sensed by the sensor members (100,102,104,112,116,120,130). An object of the present invention is to provide a washing machine having a secured tub (20) that is able to prevent collision between a drum (30) and the tub (20), and a controlling method thereof.

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Description

Title of Invention: WASHING MACHINE AND CONTROLLING METHOD THEREOF

Technical Field

[1] The present invention relates to a washing machine and a controlling method thereof.

Background Art

[2] Generally, a conventional drum type washing machine includes a cabinet defining an exterior appearance a tub provided in the cabinet to accommodate wash water. An oriented-rotatable drum is mounted to the tub to receive laundry therein. Such a drum is rotated by a motor and vibration generated by the drum is transmitted to the tub. To reduce the vibration, a vibration damping structure including a spring, a damper and a balancer and the like is provided in the conventional drum type washing machine.

[3] The tub is hung on a hanging spring inside the cabinet and the motor is mounted to a rear of the tub to rotate the drum inside the tub. That is, the drum is connected with the tub by the motor installed to the rear surface of the tub.

[4] However, if the drum is rotated at a high RPM, weight unbalance caused by eccentricity of laundry would generate vibration inside the drum. This vibration generated in the drum is transmitted to the tub and vibration is generated inside the tub, too.

[5] As a result, it is necessary to secure enough space between an outer circumferential surface of the tub and the cabinet to prevent the tub from colliding with the cabinet because of the vibration of the tub. If then, the capacity of the tub cannot be enlarged without increasing the capacity of the cabinet.

[6] In recent, consumers desire to wash larger amount of laundry even in a predetermined sized cabinet, considering a storage aspect. To satisfy the consumer's desire has been invented a tub fixing type washing machine including a tub directly connected to the cabinet, with an enlarged utilization capacity and a structure of not transmitting the vibration of the drum to the tub.

[7] According to the tub fixing type washing machine, the tub is spaced apart a predetermined distance from the drum to prevent the collision between the tub and the drum during the rotation of the drum.

Disclosure of Invention

Technical Problem

[8] however, even in the tub fixing type washing machine, a front portion inside the drum would be eccentric because of the weight of the laundry accommodated in the drum. In this state, the drum is rotated at a high rotation speed and the front of the

drum happens to collide with the tub, which should be prevented.

Solution to Problem

[9] To solve the problems, an object of the present invention is to provide a washing machine having a secured tub that is able to prevent collision between a drum and the tub, and a controlling method thereof.

[10] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a washing machine includes a cabinet defining an exterior appearance thereof; a tub provided in the cabinet, the tub receiving wash water therein; a drum rotatable inside the tub, the drum receiving laundry therein; a plurality of sensor members installed in at least one of the drum and tub, each of the sensor members sensing the distance between the drum and the tub; and a control part controlling the drum based on a sensing value sensed by the sensor members.

[11] The tub may be directly connected to at least one of inner front, side and rear surfaces of the cabinet.

[12] The control part may determine that the drum collides with the tub if the drum approaches to the tub closely to a predetermined distance or more.

[13] The control part controls a rotation speed of the drum if the drum approaches to the tub closely to the predetermined distance or more.

[14] The control part may decrease the rotation speed of the drum temporarily if the drum approaches to the tub closely to the predetermined distance or more.

[15] The control part may stop the operation of the drum temporarily if the drum approaches to the tub closely to the predetermined distance or more.

[16] The sensor member may be installed in a predetermined portion relatively more eccentric than a rotatably supported rear portion of the drum.

[17] The relatively more eccentric portion may be a front portion of the drum.

[18] The sensor member may be installed in a predetermined portion spaced apart to a maximum distance from the rotatably supported rear portion of the drum.

[19] The control part may inform a user of the close approaching or collision of the drum if the drum closely approaches to or collides with the tub.

[20] The sensor member may be configured of a magnetic and a hall sensor, the magnetic and the hall sensor mounted to the tub.

[21] The sensor member may be configured of a magnetic mounted to the drum, a reed switch and an hall IC sensor, the reed switch and the hall IC sensor mounted to the tub.

[22] The magnetic may be installed between the drum and a race of a balancer.

[23] The sensor member may be configured of a capacitor sensor mounted to the tub or drum.

[24] The sensor member may be configured of an impact-type touch sensor mounted to the tub.

[25] In another aspect of the present invention, a controlling method of a washing machine includes a distance sensing step sensing a distance between a drum and a tub based on a sensing value sensed by a sensor member; and a drum controlling step controlling the rotation speed of the drum based on the sensed sensing value.

[26] The drum controlling step may decrease the rotation speed of the drum temporarily if the drum approaches to the tub closely to a predetermined distance or more.

[27] The drum controlling step may stop the drum temporarily if the drum collides with the tub.

Advantageous Effects of Invention

[28] The present invention has following advantageous effects.

[29] A washing machine according to the present invention is able to prevent a front portion of a drum from colliding with a tub. As a result, there is an effect of preventing damage such as abrasion caused by the collision between the drum and the tub.

Brief Description of Drawings

[30] The accompanying drawings, which are included to provide further understanding of the disclosure and are incorporated in and constitute a part of this application, illustrate embodiments of the disclosure and together with the description serve to explain the principle of the disclosure.

[31] In the drawings:

[32] FIG. 1 is a sectional view illustrating a washing machine according to an exemplary embodiment of the present invention;

[33] FIG. 2 is a diagram schematically illustrating a sensor member configured of a magnetic and a hall sensor according an embodiment of the present invention;

[34] FIG. 3 is a diagram schematically illustrating the sensor member shown in FIG. 1;

[35] FIG. 4 is a diagram schematically illustrating a sensor member configured of a magnetic, a reed switch and a hall IC sensor according another embodiment;

[36] FIG. 5 is a diagram schematically illustrating the sensor member shown in FIG. 4;

[37] FIG. 6 is a diagram schematically illustrating a sensor member configured of a touch sensor according to a further embodiment;

[38] FIG. 7 is a diagram schematically illustrating the sensor member shown in FIG. 6;

[39] FIG. 8 is a diagram schematically illustrating a capacitor sensor according to a still further embodiment;

[40] FIG. 9 is a block view illustrating a controlling method of the washing machine according to an exemplary embodiment of the present invention; and

[41] FIG. 10 is a flow chart illustrating the controlling method of the washing machine.

Best Mode for Carrying out the Invention

[42] Reference will now be made in detail to the specific embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[43] The present invention presents a washing machine having a maximum capacity even in the same size as the conventional washing machine, capable of preventing collision between a drum and a tub. As follows, a drum type washing machine having a tub directly connected to a cabinet will be exemplified as an exemplary embodiment and in reference to the drawings a laundry machine according to the exemplary embodiment of the present invention will be described. Of course, the present invention may be applicable to a laundry machine having a tub not directly connected to a cabinet.

[44] As shown in FIG. 1, a laundry machine according to an exemplary embodiment of the present invention includes a cabinet 10 and a tub 20. The cabinet 10 defines an exterior appearance of the washing machine and the tub 20 is directly connected to the cabinet 10 inside the cabinet 10. An oriented-rotatable drum 30 is provided in the tub 20. A motor 40 and a bearing housing 28 are installed in a rear of the tub 20. The motor 40 rotates the drum 30. The bearing housing 28 forms the rear surface of the tub 20 and it supports a shaft 42 of the motor 40. Here, damping means 50 is installed between the bearing housing 28 and the tub to make an inside of the tub airtight and to dampen vibration or shock which will be transmitted to the tub 20 from the motor 40. In addition, a suspension assembly 60 is installed between the bearing housing 28 and the tub to support the drum and to dampen vibration or shock which will be transmitted to the bearing housing 28.

[45] A door 12 is coupled to a front surface 11 of the cabinet 10 and a base 16 is coupled to a bottom surface of the cabinet 10. Also, a top bracket 73 may be installed in a top surface of the cabinet and an elastic member 72 elastically hanging the bearing housing 28 may be fixed to the top bracket 73.

[46] The tub 20 is directly secured inside the cabinet 10 and it is preferable a surface of the tub 20 toward the door 12 is secured to an inner surface of the front 11by a screw 25 and the like. Alternatively, a side or rear surface of the tub 20 may be secured to the cabinet 10.

[47] The bearing housing 28 is assembled to a rear surface of the tub 20 and a bearing (not shown) is provided in the bearing housing 28 to make the motor shaft 42 rotate smoothly. The motor shaft 42 is supported by the bearing.

[48] The motor 40 is mounted to a rear surface of the bearing housing 28 and the motor shaft 42 is fixed to the rear surface of the drum 30, passing through the bearing

housing 28. The drum 30 is rotated, coupled to the motor shaft 42.

[49] The suspension assembly 60 includes a damper bracket 62 secured to the bearing housing 28 and a damping part secured to the damper bracket 62 to support the bearing housing 28.

[50] The damping part includes a main-damper 80 dampening vertical direction vibration of the drum 30, supporting the weight of the drum 30, and a sub-damper 90 dampening horizontal direction vibration of the drum 30. The drum 30 and the bearing housing 28 are supported by the damping part inside the tub 20.

[51] As mentioned above, the tub 20 is directly secured in the cabinet 10 and the vibration of the drum 30 is not transmitted to the tub 20. As a result, a diameter of the tub may be enlarged in comparison to the conventional washing machine and each utilization capacity of the tub 20 and the drum 30 may be enlarged advantageously.

[52] If vibration or shock is transmitted to the tub 20 integrally secured to the cabinet 10, the tub 20 is vibrated or tumbled. In addition, the strength of the tub is increased by the weight of the cabinet 10 applied to the tub 20 and thus an overall vibration property of the washing machine may be expected to be improved.

[53] According to the present invention, the drum 30 is supported in one side, that is, only the rear surface of the drum 30 is supported and the capacity of the drum inside may be enlarged in comparison to the drum supported in both sides. As a result, the number of the required parts is reduced and productivity is improved.

[54] There is predetermined space between the tub 20 and the drum 30 such that the drum 30 in vibration may not collide with the tub 20. That is, the tub 20 is spaced apart a predetermined distance from the drum 30. However, a front portion of the drum inside receiving wash water or laundry may be leaning to one side because of the weight of the laundry or wash water. If the drum rotates in this state, the front portion of the drum may collide with the tub 20 or the drum 30 happens to strike the tub 20.

[55] Only the rear portion of the drum 30 is supportably secured to the bearing housing 28 and the front portion thereof is relatively free in comparison to the rear portion. As a result, the relative motion of the drum 30 possibly causes the collision between the tub 20 and the drum 30 and thus a sensor member is invented as means for preventing the collision according the present invention.

[56] At least one sensor member 100 is installed in a front inner portion of the tub 20 or a front outer portion of the drum 30 and the sensor member 100 senses the distance or collision between the tub 20 and the drum 30. A sensing value sensed by the sensor member 100 is transmitted to a control part provided in the control panel (not shown). The control part controls the rotation speed of the drum 30 for the drum 30 not to collide with the tub 20 based on the sensed sensing value.

[57] In reference to FIGS. 9 and 10, the sensor member will be described in detail. The

control part senses the distance between the drum 30 and the tub 20 based on the sensing value sensed by the sensor member 100, which is referenced to as 'distance sensing step'S100).

[58] The control part determines whether the distance between the drum 30 and the tub 20 is a predetermined value or more (S110). If the drum 30 approaches to the tub 20 as close as the predetermined value, that is, the distance is over the predetermined value, it is determined that there is danger of collision between the drum 30 and the tub 20 (S130) and the rotation speed of the drum 30 is controlled. Here, the control part decreases the rotation speed of the drum 30 temporarily for the drum 30 not to collide with the tub 20, which is referenced to as 'drum controlling step, S200).

[59] The control part determines whether the drum 30 collides with the tub 20 if the distance between the drum 30 and the tub 20 is a predetermined value or more (S120). If the drum 30 collides with the tub 20, the control part stops the operation of the drum 30 temporarily ('drum controlling step', S200.)

[60] The control part checks the distance between the drum 30 and the tub 20 continuously by using the sensor member 100 to prevent the drum 30 from colliding with the tub 20. However, if a large amount of laundry is received in the drum 30 and the drum 30 is rotated at a high rotation speed, the drum 30 would collide with the tub 20 before the rotation speed of the drum 30 is controlled. If then, it is preferable that the drum 30 is temporarily stopped before re-operated.

[61] The sensor member 100 may be installed in the front portion of the drum spaced apart to maximum from the rear portion of the drum 30 rotatably supported by the bearing housing 28.

[62] A plurality of sensor members 100 may be installed, being spaced apart a predetermined distance from each other. Since the drum 30 is possibly leaning toward the front portion as mentioned above, the sensor member 100 may be provided in a front portion underneath the drum 30.

[63] As follows, the sensor member 100 will be described in detail in reference to FIGS. 2 to 8.

[64] The sensor member 100 may be configured of at least one of a non-impact sensor, impact sensor and capacitor sensor.

[65] The non-impact sensor may be mounted to the tub 20 and it is configured of a magnetic 102 and a hall sensor 102. alternatively, and the non-impact sensor configured of a magnetic 112 that is mounted to the drum 30, a reed switch 114 and a hall IC sensor 116 that are mounted to the tub 20.

[66] As shown in FIG. 2, the magnetic 102 and the hall sensor 104 of the former sensor type are installed in the tub 20 and the output is measured according to the change of magnetic force such that it is determined whether the drum approaches to the tub 20.

[67] As shown in FIG. 3, the hall sensor 104 is a voltage type outputting a predetermined voltage, installed together with the magnetic 102. If the drum 30 approaches to the tub 20 closely, the drum 30 is fabricated with metal that can influence on the magnetic field of the magnetic 102. Thus, the voltage having output regularly is changed and it is may be sensed whether the drum 30 collides with the tub 20.

[68] The control part determined whether the voltage is a reference value or more based on voltage data. If the voltage is the reference value or more, it is determined that the drum 30 approaches to the tub closer than the predetermined distance and the control part controls the rotation speed, that is, RPM of the drum 30. The control part controls the rotation of the motor 40 to decrease RPM of the drum 30 temporarily such that the distance between the drum 30 and the tub 20 is increased.

[69] If the drum 30 approaches to the tub 20 closer than the predetermined distance enough to collide with the tub 20, the drum 30 is stopped temporarily to prevent the damage such as abrasion of the drum and the tub 20. Hence, the rotation speed of the drum 30 is re-increased slowly to rotate the drum 30.

[70] As shown in FIG. 4, the latter sensor type configured of a magnetic 112 mounted to the drum 30 and the reed switch 114 and the hall IC sensor 116 mounted to the tub 20 may sense whether the drum 30 approaches to the tub 20 based on the voltage changes like the former sensor type.

[71] As shown in FIG. 5, the magnetic 112 may be inserted between the drum 30 and a race 34a guiding motion of a ball provided in a balancer. The reed switch 114 and the hall IC sensor 116 are mounted to the tub 20. The magnetic 12 is installed and sealed with a cut-away portion of the drum 30 for the reed switch 114 and the hall IC sensor 116 to respond to the magnetic 112.

[72] If the drum 30 approaches to the tub 20 more closely than the predetermined distance, the reed switch 114 is powered on because of the influence of the magnetic 112. The hall IC sensor 116 senses an on signal of the reed switch 114 to generate a corresponding signal. The control part receives this signal and controls the rotation speed of the motor 40. That is, it is controlled that RPM of the drum 30 is decreased temporarily or that the drum 30 is stopped temporarily.

[73] As shown in FIG. 6, the impact sensor configured of a touch sensor 120 is mounted to the tub 20.

[74] As shown in FIG. 7, the touch sensor 120 is installed in the tub 20. When the drum 30 directly collides with the tub 20, the touch sensor 120 is pressed by the drum 30 and it is sensed whether there is collision between the drum 30 and the tub 20.

[75] If the touch is sensed by the touch sensor 120, the control part determines that the drum 30 approaches to the tub 20 too closely. As soon as the touch with the touch sensor 120 is sensed, the control part controls the rotation speed of the motor 40. That

is, it is controlled that RPM of the drum 30 is decreased temporarily or that the drum 30 is stopped temporarily.

[76] As shown in FIG. 8, a capacitor sensor 130 is mounted to the tub 20 and the capacitor sensor 130 senses the distance or and collision between the drum 30 and the tub 20 because it has different permittivity according to approaching distance of the metal drum 30.

[77] The capacitor sensor 130 includes two electrode plates 132 charged with different electrodes, respectively, and it is connected with external electricity to form a circuit. Such the capacitor sensor 130 has predetermined permittivity. As the front portion of the drum 30 approaches to the tub 20 closely, the charged electrode plates 132 are influenced to differentiate the permittivity.

[78] Hence, the control part compares the permittivity change with a predetermined permittivity value and it calculates the distance between the drum 30 and the tub 20. If the drum approaches to the tub 20 closely, the control part controls the rotation speed of the motor 40 and it controls to decrease RPM of the drum 30 temporarily or to stop the drum 30 temporarily.

[79] As mentioned above, various kinds of sensor members may be applicable to the washing machine according to the present invention and thus the present invention may have an advantage of preventing the front portion of the rotating drum that is relatively fee from colliding with the front portion of the tub because of the eccentricity of the laundry.

[80] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

[Claim 1] A washing machine comprising:
a cabinet defining an exterior appearance thereof;
a tub provided in the cabinet, the tub receiving wash water therein;
a drum rotatable inside the tub, the drum receiving laundry therein;
a plurality of sensor members installed in at least one of the drum and tub, each of the sensor members sensing the distance between the drum and the tub; and
a control part controlling the drum based on a sensing value sensed by the sensor members.

[Claim 2] The washing machine as claimed in claim 1, wherein the tub is directly connected to at least one of inner front, side and rear surfaces of the cabinet.

[Claim 3] The washing machine as claimed in claim 2, wherein the control part determines that the drum collides with the tub if the drum approaches to the tub closely to a predetermined distance or more.

[Claim 4] The washing machine as claimed in claim 3, wherein the control part controls a rotation speed of the drum if the drum approaches to the tub closely to the predetermined distance or more.

[Claim 5] The washing machine of claim 3, wherein the control part decreases the rotation speed of the drum temporarily if the drum approaches to the tub closely to the predetermined distance or more.

[Claim 6] The washing machine of claim 3, wherein the control part stops the operation of the drum temporarily if the drum collides with the tub.

[Claim 7] The washing machine of claim 2, wherein the sensor member is installed in a relatively more eccentric portion than a rotatably supported rear portion of the drum.

[Claim 8] The washing machine of claim 7, wherein the more eccentric portion of the drum is a front portion of the drum.

[Claim 9] The washing machine as claimed in claim 7, wherein the sensor member is installed in a portion spaced apart to a maximum distance from the rotatably supported rear portion of the drum.

[Claim 10] The washing machine as claimed in claim 7, wherein the control part informs a user of the close approaching or collision of the drum if the drum closely approaches to or collides with the tub.

[Claim 11] The washing machine of claim 7, wherein the sensor member is configured of a magnetic and a hall sensor, the magnetic and the hall

sensor mounted to the tub.

[Claim 12] The washing machine of claim 7, wherein the sensor member is configured of a magnetic mounted to the drum, a reed switch and an hall IC sensor, the reed switch and the hall IC sensor mounted to the tub.

[Claim 13] The washing machine of claim 11 or 12, wherein the magnetic is installed between the drum and a race of a balancer.

[Claim 14] The washing machine of claim 7, wherein the sensor member is configured of a capacitor sensor mounted to the tub or drum.

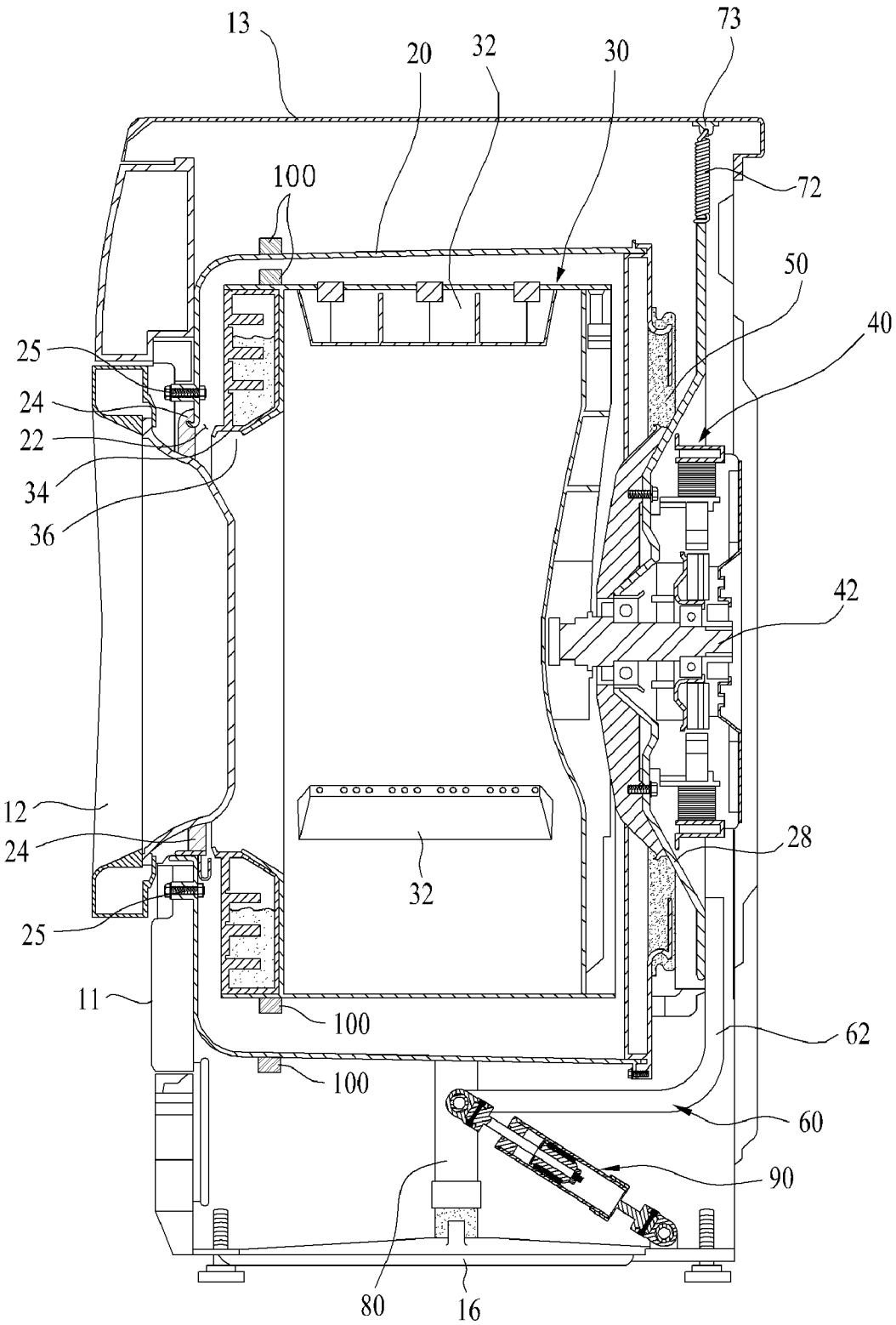
[Claim 15] The washing machine of claim 7, wherein the sensor member is configured of an impact-type touch sensor mounted to the tub.

[Claim 16] A controlling method of a washing machine comprising:
a distance sensing step sensing a distance between a drum and a tub based on a sensing value sensed by a sensor member; and
a drum controlling step controlling the rotation speed of the drum based on the sensed sensing value.

[Claim 17] The controlling method as claimed in claim 16, wherein the drum controlling step decreases the rotation speed of the drum temporarily if the drum approaches to the tub closely to a predetermined distance or more.

[Claim 18] The controlling method of claim 16, wherein the drum controlling step stops the drum temporarily if the drum collides with the tub.

[Fig. 1]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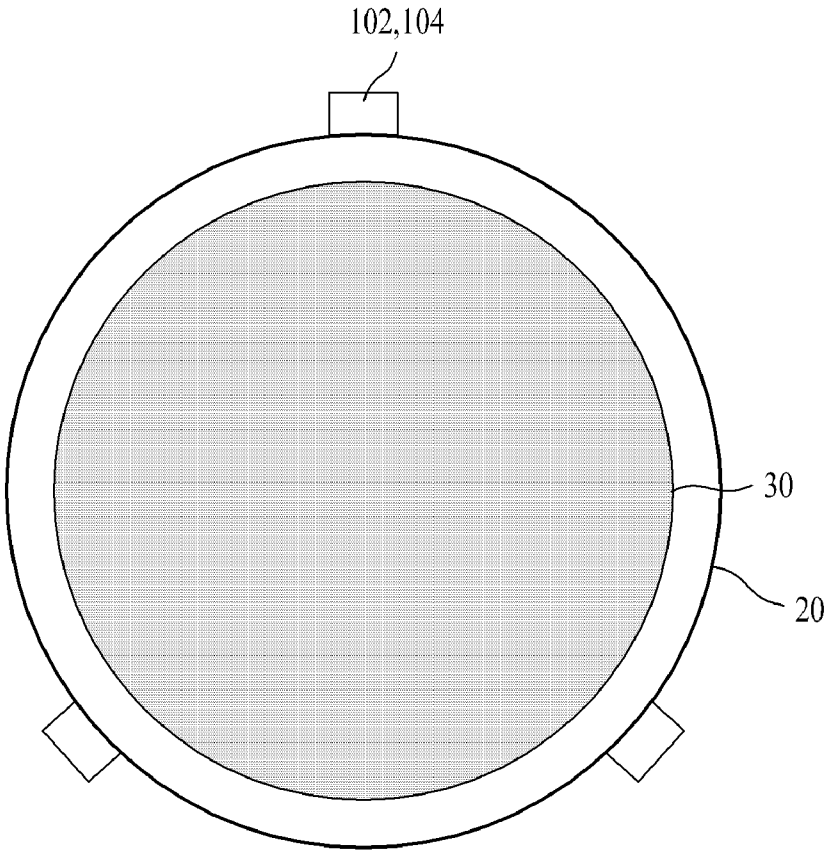
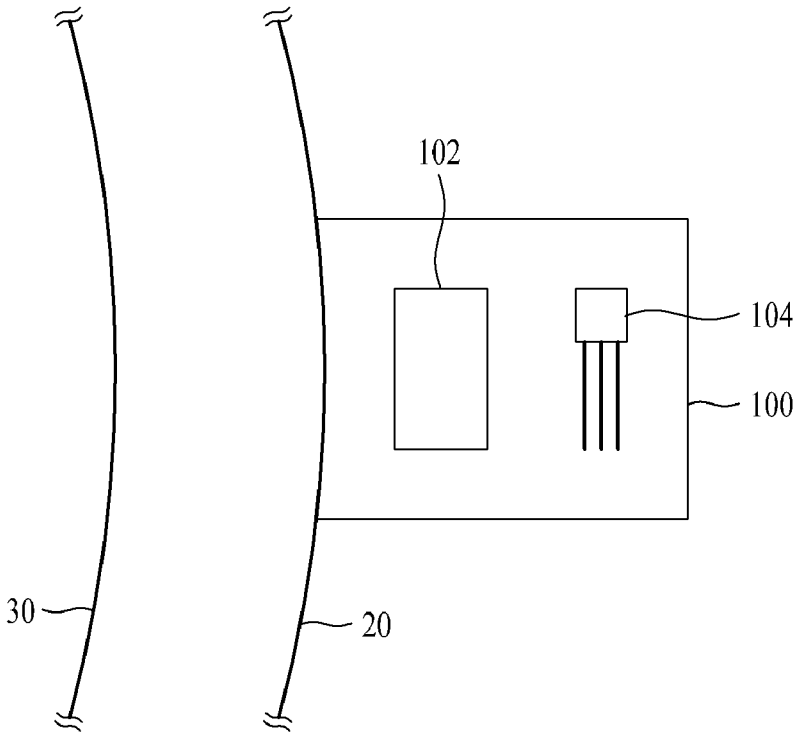
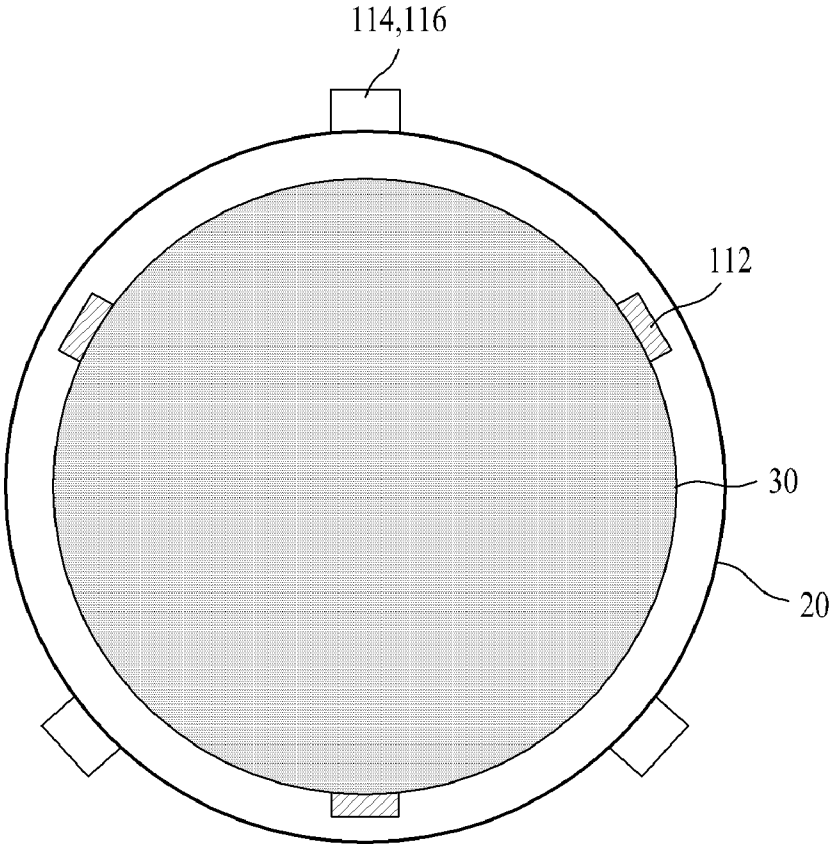
[Fig. 2]



[Fig. 3]



[Fig. 4]


114,116
112
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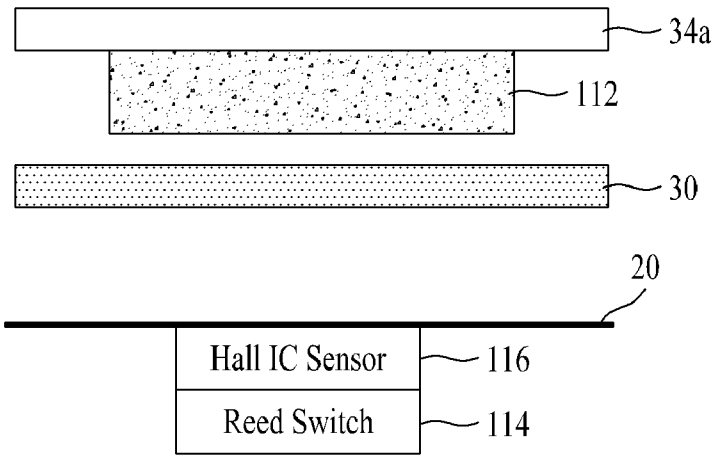
20

[Fig. 5]


34a
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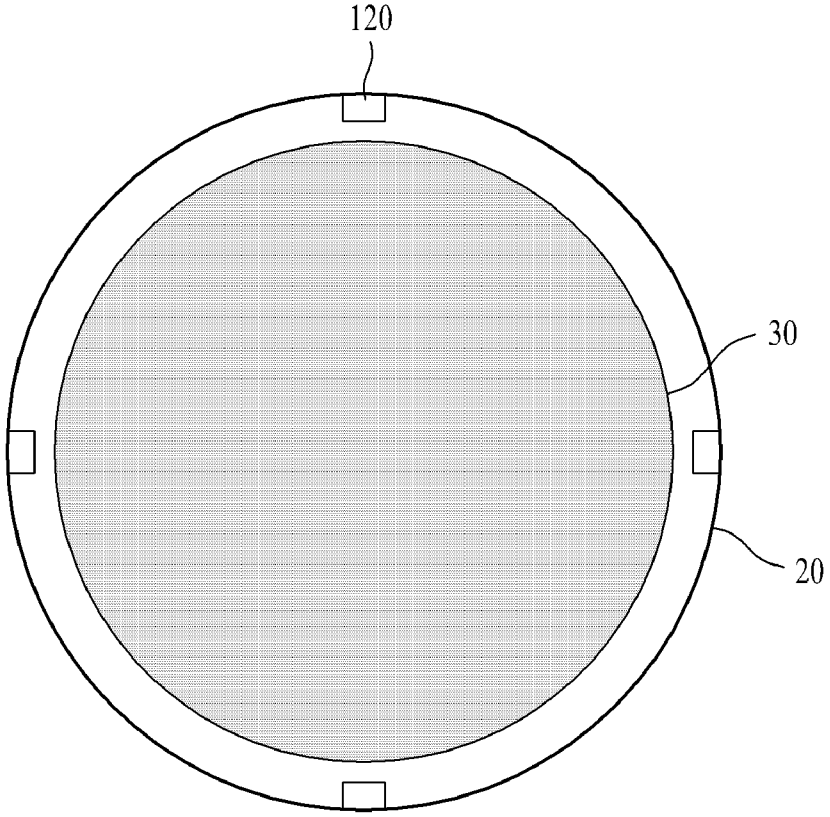
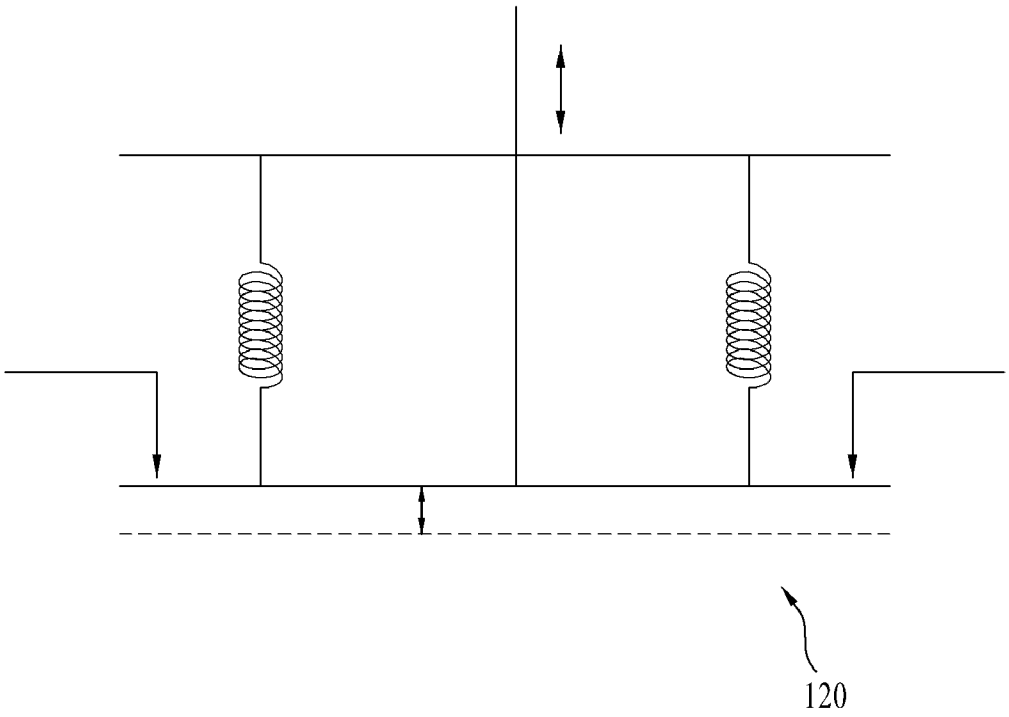
Hall IC Sensor
116
Reed Switch
114

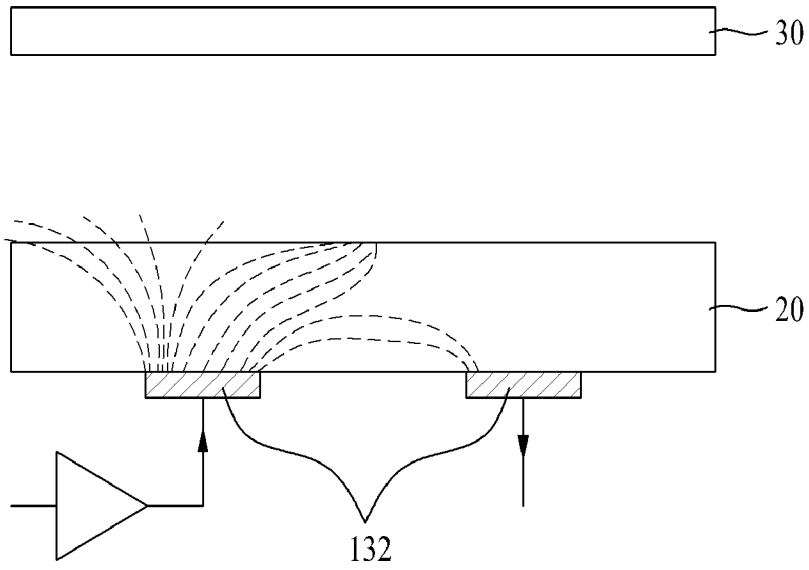
[Fig. 6]



[Fig. 7]



[Fig. 8]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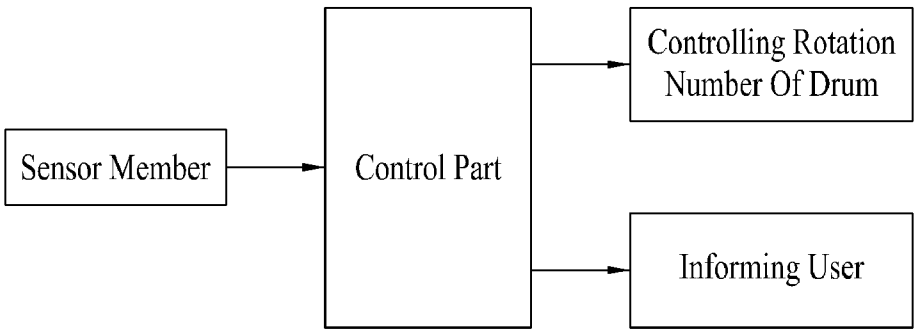
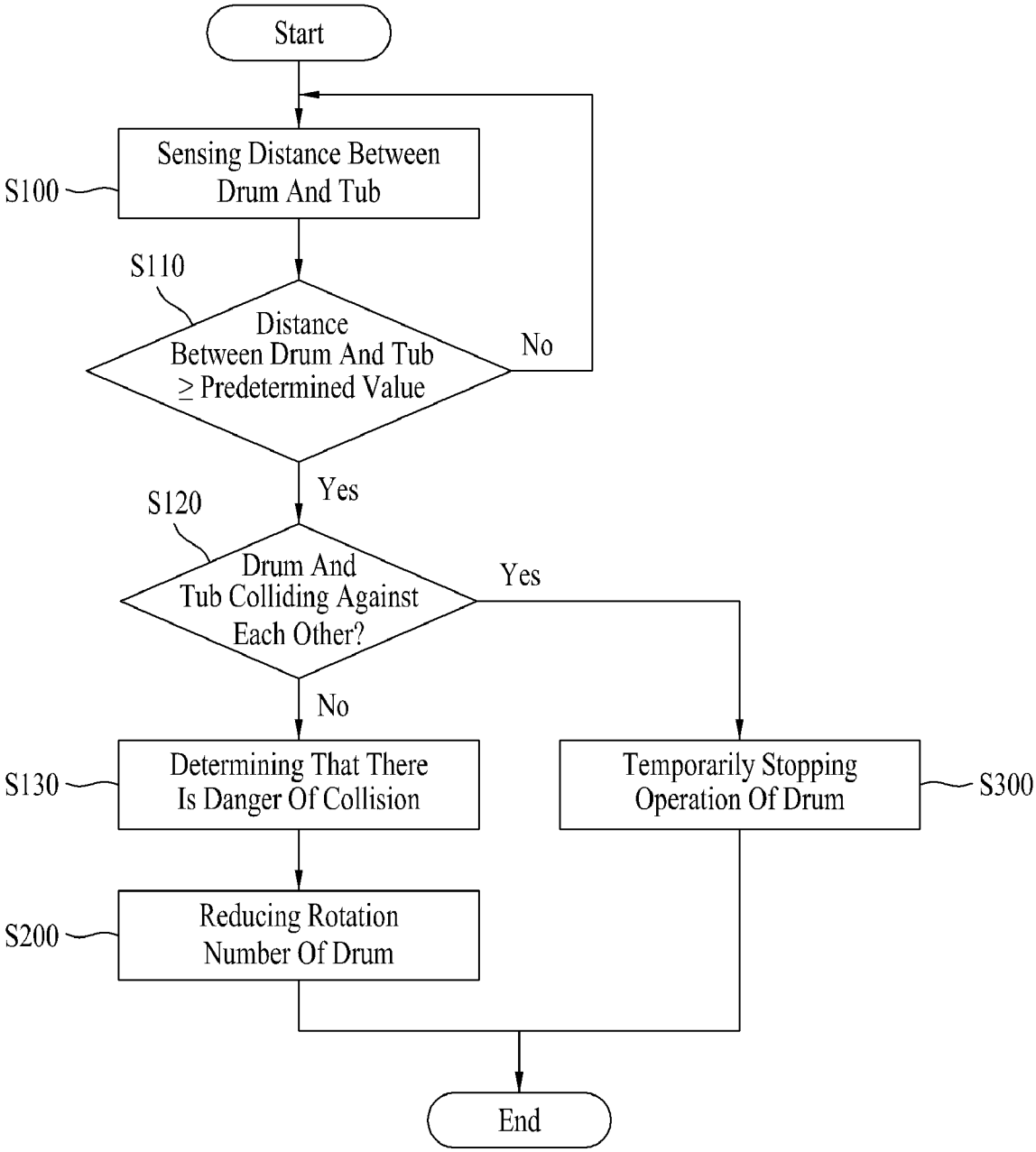
[Fig. 9]


Sensor Member
Control Part
Controlling Rotation Number Of Drum
Informing User

[Fig. 10]


Start
Sensing Distance Between Drum And Tub
S100
S110
Distance Between Drum And Tub ≥ Predetermined Value
No
Yes
S120
Drum And Tub Colliding Against Each Other?
Yes
No
Determining That There Is Danger Of Collision
S130
Temporarily Stopping Operation Of Drum
S300
Reducing Rotation Number Of Drum
S200
End

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2010/001189

A. CLASSIFICATION OF SUBJECT MATTER

IPC[8]: ***D06F 33/02*** (2006.01); ***D06F 37/20*** (2006.01)

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)

IPC[8]: 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)

EPODOC,WPI,TXTnn

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	GB 2 361 715 A (DYSON LTD; NOTETRY LTD) 31 October 2001 (31.10.2001) *Whole document.*	1-10,16-18 11-15
	--	
Y	DE 43 19 614 C1 (BAUKNECHT HAUSGERAETE) 18 August 1994 (18.08.1994) *Whole document.*	11,12,13
	--	
Y	EP 1 108 809 A1 (BSH BOSCH SIEMENS HAUSGERAETE) 20 June 2001 (20.06.2001) *Claims 1,3,15,16,19-21; figure.*	14
	--	

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 August 2010 (25.08.2010)	7 September 2010 (07.09.2010)

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2010/001189

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 032 494 A (TANIGAWA ET AL) 7 March 2000 (07.03.2000) *Description column 25, lines 35 - 62.*	15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 2010/001189

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				EP	A2	1354998	2003-10-22
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				DE	T2	69633687T	2006-03-09
				DE	T2	69630567T	2004-09-16