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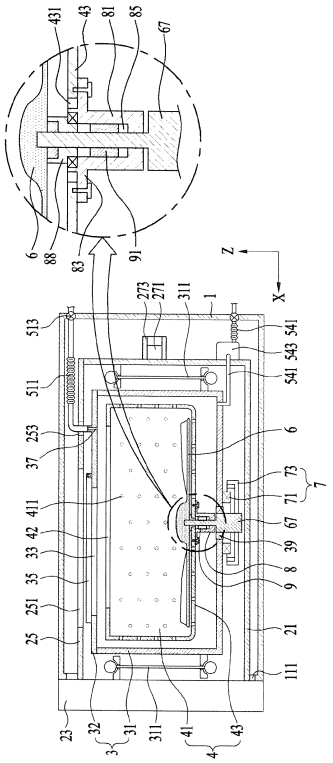
(54) LAUNDRY PROCESSING APPARATUS

(57) The present invention relates to a laundry processing apparatus comprising: a tub for storing water and provided with an opening for putting in and taking out laundry; a drum, provided in the interior of the tub, for storing the laundry supplied through the opening; an agitator rotatably provided inside the drum; a rotating shaft connected to the agitator by penetrating the tub and drum; a driving part for rotating the rotating shaft; a connecting part provided with a connecting body fixed to the drum, and a body-penetrating hole which is provided so as to penetrate the connecting body and through which the rotating shaft is inserted; and a power transmission part moving back and forth inside the body-penetrating hole when the rotation shaft is rotating, and when same has rotated by a previously set number of times, transferring the power supplied by the rotating shaft to the connecting body.

【Fig. 2】



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Description

[Technical Field]

[0001] The present invention relates to a laundry treatment apparatus.

[Background Art]

[0002] In general, a laundry treatment apparatus is understood to include an apparatus adapted to wash laundry (objects to be washed or objects to be dried), an apparatus adapted to dry laundry, and an apparatus adapted to perform both washing and drying of laundry.

[0003] A laundry treatment apparatus of the related art includes a cabinet, a drawer retractably provided in the cabinet, and an accommodation unit disposed in the drawer to provide a laundry accommodation unit (a laundry treatment space) for washing or drying laundry.

[0004] In the laundry treatment apparatus including a laundry accommodation unit that is disposed in a drawer retractably provided in a cabinet, in order to improve the washing performance of the laundry treatment apparatus, the volume of the laundry accommodation unit needs to be increased so that the laundry accommodation unit can contain a larger amount of water and laundry.

[0005] Therefore, when designing a laundry treatment apparatus including a laundry accommodation unit disposed in a drawer, it is very important to improve washing performance while minimizing the volume of the laundry accommodation unit.

[Disclosure]

[Technical Problem]

[0006] An object of the present invention devised to solve the problem lies in a laundry treatment apparatus that is capable of improving washing performance while minimizing the volume thereof.

[0007] Another object of the present invention devised to solve the problem lies in a laundry treatment apparatus in which a drum containing laundry and an agitator rotatably provided in the drum are rotated by a single driving unit.

[0008] A further object of the present invention devised to solve the problem lies in a laundry treatment apparatus in which an agitator and a drum are rotated together in the same direction after the agitator has rotated a predetermined number of times within the drum.

[Technical Solution]

[0009] The objects of the present invention can be achieved by providing a laundry treatment apparatus including a tub for containing water, the tub including an introduction port through which laundry is introduced into or taken out of the tub, a drum provided in the tub, the drum containing the laundry supplied thereto through the introduction port, an agitator rotatably provided in the drum, a rotating shaft penetrating the tub and the drum so as to be connected to the agitator, a driving unit for rotating the rotating shaft, a connecting unit including a connecting body secured to the drum and a body through-hole formed through the connecting body so as to allow the rotating shaft to be inserted thereinto, and a power transmission unit configured so as to move reciprocatingly within the body through-hole when the rotating shaft rotates, the power transmission unit transmitting the power provided by the rotating shaft to the connecting body after the rotating shaft has rotated a predetermined number of times.

[0010] The power transmission unit may include a first stopper and a second stopper secured to the body through-hole, the first stopper and the second stopper being spaced apart from each other by a predetermined distance, an operating unit located in the body through-hole, the operating unit being configured to move reciprocatingly between the first stopper and the second stopper, a through-hole formed through the operating unit so as to allow the rotating shaft to be inserted thereinto, a first thread provided in the through-hole, and a second thread provided at the rotating shaft so as to mesh with the first thread, the second thread moving the operating unit toward the first stopper or the second stopper when the rotating shaft rotates.

[0011] The present invention may further include a receiving portion formed in the connecting body, the receiving portion having a diameter that is greater than the diameter of the body through-hole and defining a moving path of the operating unit.

[0012] The present invention may further include an escape-preventing unit for preventing the operating unit from escaping from the receiving portion, the escape-preventing unit being rotatably supported by the connecting body and being configured to allow the rotating shaft to pass therethrough.

[0013] The first stopper may be an oilless bearing that is supported by the escape-preventing unit and is configured to allow the rotating shaft to pass therethrough, and the second stopper may be an oilless bearing that is supported by the stepped portion and is configured to allow the rotating shaft to pass therethrough.

[0014] The first stopper may be a spring located between the escape-preventing unit and the operating unit so as to provide force to the operating unit so that the operating unit moves away from the escape-preventing unit, and the second stopper may be a spring located between the stepped portion and the operating unit so as to provide force to the operating unit so that the operating unit moves away from the stepped portion.

[0015] The first stopper may be an escape-preventing unit for preventing the operating unit from escaping from the receiving portion, the escape-preventing unit being rotatably supported by the connecting body and being configured to allow the rotating shaft to pass there-

through.

[0016] The second stopper may be a stepped portion formed between the receiving portion and the body through-hole.

[0017] The present invention may further include a cabinet including an entrance formed therein and a drawer to which the tub is secured, the drawer being retractable from the cabinet through the entrance.

[0018] The rotating shaft may penetrate the lower surface of the tub and the lower surface of the drum, and may be secured to the agitator.

[0019] The rotating shaft may be arranged perpendicular to the ground on which the cabinet is seated.

[0020] The driving unit may include a stator secured to the lower surface of the tub while being located outside the tub, the stator being configured to generate a rotating magnetic field, and a rotor configured to be rotated by the rotating magnetic field generated by the stator, wherein the rotating shaft may be secured to the rotor.

[0021] The agitator may include a body disposed in the drum so as to be secured to the rotating shaft, the body being formed in the shape of a circular plate, arranged parallel to the lower surface of the drum, and an arm protruding from the body toward the introduction port.

[0022] The present invention may further include a communication hole formed through the lower surface of the drum so that the inside of the drum communicates with the inside of the tub therethrough, and an agitator through-hole formed through the body.

[Advantageous Effects]

[0023] The present invention may provide a laundry treatment apparatus that is capable of improving washing performance while minimizing the volume thereof.

[0024] In addition, the present invention may provide a laundry treatment apparatus in which a drum containing laundry and an agitator rotatably provided in the drum are rotated by a single driving unit.

[0025] In addition, the present invention may provide a laundry treatment apparatus in which an agitator and a drum are rotated together in the same direction after the agitator has rotated a predetermined number of times within the drum.

[Description of Drawings]

[0026]

FIGS. 1 and 2 are views illustrating an example of a laundry treatment apparatus according to the present invention.

FIG. 3 is a view illustrating an example of an agitator included in the laundry treatment apparatus according to the present invention.

FIGS. 4 and 5 are views illustrating an example of a power transmission unit included in the laundry treatment apparatus according to the present invention.

FIG. 6 is a view illustrating another example of the power transmission unit included in the laundry treatment apparatus according to the present invention.

[Best Mode]

[0027] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. Meanwhile, the configuration of an apparatus or a control method thereof, which will be described below, is merely given to describe the embodiments of the present invention, and is not intended to limit the scope of the present invention. The same reference numerals used throughout the specification refer to the same constituent elements.

[0028] As shown in FIG. 1, a laundry treatment apparatus 100 according to the present invention includes a cabinet 1, a drawer 2, which is retractably provided in the cabinet 1, and a laundry accommodation unit 3 and 4, which is disposed in the drawer so as to provide a space required to treat laundry.

[0029] The cabinet 1 is provided with an entrance 11, through which the drawer 2 may be drawn out of the cabinet 1 or may be inserted into the cabinet 1. The cabinet 1 may be configured such that the length in the width direction (in the Y-axis direction) is greater than the length in the height direction (in the Z-axis direction) (the drawer may be configured such that the length in the width direction is greater than the length in the height direction).

[0030] As shown in FIG. 2, the drawer 2 includes a drawer body 21 having an opening formed in the upper surface thereof, and a drawer cover 25 provided at the opening in the drawer body. That is, the drawer body 21 may be configured to have a hollow hexahedral form, and the drawer cover 25 may be secured to the drawer body 21 so as to define the upper surface of the drawer body 21.

[0031] The drawer body 21 may be drawn out of the cabinet 1 or may be inserted into the cabinet 1 using a slider. The slider may include a slider body 271, which is secured to any one of the cabinet 1 and the drawer body 21, and a slider housing 273, which is secured to the remaining one of the cabinet and the drawer body in order to define a moving path of the slider body 271.

[0032] The drawer body 21 is provided at the front surface thereof with a drawer panel 23, which serves as means for opening and closing the entrance 11 of the cabinet.

[0033] The drawer panel 23 may be provided with a control panel 231 (refer to FIG. 1) for controlling the operation of the laundry treatment apparatus 100. The control panel 231 is provided with a unit (a controller of the laundry treatment apparatus) for controlling units for supplying water to the laundry accommodation unit 3 and 4 and discharging water from the laundry accommodation unit 3 and 4 (a water supply unit and a water discharge unit), a unit for rotating laundry (a driving unit), units for supplying steam or hot air to laundry (a hot air supply

unit and a moisture supply unit), and the like.

[0034] In addition, the control panel 231 may be provided with an input unit, for enabling a user to input control commands into the laundry treatment apparatus 100, and a display unit (a unit for displaying operational information of the laundry treatment apparatus), for enabling a user to check control commands input through the input unit or notifying a user of the state of execution of the control commands input by the user.

[0035] The drawer cover 25 may be provided with a first cover through-hole 251 and a second cover through-hole 253, which are formed through the drawer cover 25 so that the inside of the drawer body 21 communicates with the outside.

[0036] The laundry accommodation unit 3 and 4, which is provided in the drawer 2, may include a tub 3, which is provided in the drawer body 21 so as to define a space for containing water, and a drum 4, which is rotatably provided in the tub so as to contain laundry.

[0037] The tub 3 may include a tub body 31, which is secured to the inside of the drawer 2 by a tub support unit 311, and a tub cover 32, which defines the upper surface of the tub body.

[0038] The tub cover 32 is provided with an introduction port 33, through which the inside of the tub body 31 communicates with the outside of the tub. The introduction port 33 is opened and closed by a door 35.

[0039] The door 35 may be hinged to the tub cover 32 (so as to open and close a portion of the tub cover). The door 35 may be rotated toward the outside of the drawer 2 through the first cover through-hole 251 formed in the drawer cover 25. That is, the door 35 is located within a region of the tub cover 32 that corresponds to the first through-hole 251. Accordingly, a user may put laundry into the introduction port 33 by opening the door 35 after drawing the drawer 2 out of the cabinet 1.

[0040] The tub cover 32 is provided with a water supply hole 37, through which water is introduced into the tub body 31. The water supply hole 37 is connected with one end of a water supply pipe 511, which will be described later.

[0041] The drum 4 includes a cylindrical-shaped drum body 41 and communication holes 411, through which the inside of the drum body communicates with the tub. The communication holes 411 may be formed in the circumferential surface and the lower surface 43 of the drum body 41. Accordingly, water contained in the tub body 31 may move into the drum body 41 through the communication holes 411, and water in the drum body 41 may move to the tub body 31 through the communication holes 411.

[0042] The drum body 41 is provided at the upper surface thereof with a drum introduction port 42, through which laundry supplied through the introduction port 33 is introduced into the drum body 41.

[0043] The reason why the laundry accommodation unit 3 and 4 is composed of the tub 3 and the drum 4 is to enable the laundry treatment apparatus 100 according to the present invention to perform a washing function. Accordingly, in order to enable the laundry treatment apparatus 100 to also perform a function of drying laundry in addition to the washing function, a hot air supply unit (not shown) for supplying hot air to the tub 3 may be further provided in the cabinet 1.

[0044] The hot air supply unit (not shown), which is provided in the laundry treatment apparatus 100, may include a circulation duct, for circulating the air in the tub 3, and a heat exchanger, which is provided in the circulation duct in order to dehumidify and heat the air discharged from the tub.

[0045] Alternatively, the hot air supply unit (not shown) provided in the laundry treatment apparatus may include a discharge duct for discharging the air in the tub to the outside of the cabinet 1, a supply duct for supplying the air outside the tub 3 to the tub 3, and a heat exchanger for heating the air introduced into the supply duct.

[0046] When the laundry treatment apparatus 100 according to the present invention is constructed so as to perform a function of washing laundry, the laundry treatment apparatus 100 needs to further include a water supply unit and a water discharge unit.

[0047] The water supply unit may include the water supply pipe 511, which connects a water supply source located outside the cabinet 1 to the water supply hole 37, and a valve 513 for opening and closing the water supply pipe 511 under the control of the controller (not shown).

[0048] The water supply pipe 511 penetrates the drawer cover 25 through the second cover through-hole 253. The water supply pipe 511 may be configured to have an extendable structure, or may be made of a flexible material in consideration of the moving range of the drawer.

[0049] The water discharge unit serves to discharge the water contained in the tub 3 to the outside of the cabinet 1. The water discharge unit may include a water discharge pipe 541 for guiding the water in the tub 3 to the outside of the cabinet 1, and a pump 543, which is disposed in the water discharge pipe 541 in order to discharge the water in the tub 3. The water discharge pipe may also be configured to have an extendable structure, or may be made of a flexible material.

[0050] In order to minimize the volume of the laundry treatment apparatus 100 having the above-described configuration, the volume of the laundry accommodation unit 3 and 4 needs to be minimized. However, a reduction in the volume of the laundry accommodation unit 3 and 4 may reduce the amount of water that the tub 3 can contain, and thus may degrade washing performance.

[0051] In order to solve this problem, the laundry treatment apparatus 100 according to the present invention may further include an agitator 6, which is rotatably provided in the drum 4.

[0052] As shown in FIG. 3, the agitator 6 serves to agitate laundry supplied to the drum body 41. The agitator 6 may include a body 61 disposed in the drum and arms 63 protruding toward the drum introduction port 42 from

the body 61.

[0053] The body 61 may be formed in the shape of a circular plate that is parallel to the lower surface 43 of the drum, and the arms 63 may be arranged radially about the rotation center of the body 61.

[0054] The body 61 is configured to rotate about a rotating shaft 67. As shown in FIG. 2, the rotating shaft 67 may penetrate the lower surface of the tub and the lower surface 43 of the drum, and may be secured to the body 61. The rotating shaft 67 may be arranged perpendicular to the ground (perpendicular to the lower surface of the cabinet).

[0055] In this case, a rotating shaft bearing 39 may also be provided at the lower surface of the tub in order to rotatably support the circumferential surface of the rotating shaft 67, and a drum through-hole 431, through which the rotating shaft is inserted, may also be formed in the lower surface 43 of the drum.

[0056] As shown in FIG. 3, the agitator 6 may further include agitator through-holes 65, which are formed through the body 61. When the body 61 of the agitator is configured as a plate that is parallel to the lower surface 43 of the drum, the body 61 may interrupt the movement of water that is discharged to the tub 3 through the lower surface 43 of the drum or the movement of water that is introduced through the lower surface 43 of the drum from the tub. This problem may be prevented by the agitator through-holes 65.

[0057] The drum 4 and the agitator 6 having the above-described configurations may be rotated simultaneously in the same direction, or only the agitator 6 may be rotated by a driving unit 7, a connecting unit 8 and a power transmission unit 9.

[0058] In more detail, the driving unit 7, the connecting unit 8 and the power transmission unit 9 are configured so that the agitator 6 and the drum 4 are rotated simultaneously in the same direction after the agitator has rotated a predetermined number of times.

[0059] As shown in FIG. 2, the driving unit 7 may include a stator 71, which is secured to the tub in order to generate a rotating magnetic field, and a rotor 73, which is configured to be rotated by the rotating magnetic field generated by the stator.

[0060] The stator 71 is secured to the lower surface of the tub body 31 and is located outside the tub body 31, and the rotating shaft 67 is secured to the rotor 73.

[0061] Unlike the configuration illustrated in FIG. 2, the driving unit 7 may include a driven pulley, which is secured to the rotating shaft 67 and is located outside the tub 3, a motor, which is secured to a location outside the tub 3, a driving pulley, which is configured to be rotated by a rotating shaft of the motor, and a belt, which connects the driving pulley to the driven pulley.

[0062] When the driving unit 7 is formed to have the configuration illustrated in FIG. 2, it may be possible to minimize power loss (improve washing performance), which may occur during the power transmission process, in comparison with the mechanism in which the power from the motor is transmitted via the driving pulley, the driven pulley and the belt.

[0063] As shown in FIG. 4, the connecting unit 8 includes a connecting body 81, which is secured to the lower surface 43 of the drum, and a body through-hole 85, which is formed through the connecting body 81 so as to define a space into which the power transmission unit 9 is inserted.

[0064] The connecting body 81 serves to form the rotating shaft of the drum 4. The connecting body 81 may be provided at the circumferential surface thereof with a coupling portion 83, which is secured to the lower surface 43 of the drum.

[0065] The power transmission unit 9 is configured so as to move reciprocatingly within the body through-hole 85 when the rotating shaft 67 rotates. The power transmission unit 9 is characterized in that it transmits the power provided by the rotating shaft 67 to the connecting body 81 after the rotating shaft 67 has rotated a predetermined number of times.

[0066] The power transmission unit 9 may include an operating unit 91, which moves reciprocatingly within the body through-hole 85, a through-hole 92, which is formed through the operating unit 91 and through which the rotating shaft 67 is inserted, a first stopper 95 and a second stopper 96 for setting a moving range of the operating unit 91, and a transfer unit 93, which moves the operating unit 91 toward the first stopper or the second stopper when the rotating shaft 67 rotates.

[0067] As shown in FIG. 5, the operating unit 91, which is formed in the shape of a ring that is provided in the center thereof with the through-hole 92, may be disposed in a receiving portion 87, which is formed in the connecting body 81. The receiving portion 87 serves to define the moving path of the operating unit 91. The receiving portion 87 may be formed so as to be concentric with the body through-hole 85 and to have a diameter larger than that of the body through-hole 85.

[0068] The transfer unit 93 may include a first thread 931, which is provided in the through-hole 92, and a second thread 933, which is provided on the circumferential surface of the rotating shaft 67 and meshes with the first thread 931 so as to move the operating unit 91 toward the first stopper 95 or the second stopper 96 when the rotating shaft 67 rotates.

[0069] In order to prevent the operating unit 91 from escaping from the receiving portion 87, the connecting unit 8 may further include an escape-preventing unit 88, which is rotatably secured to the connecting body 81 so as to prevent the operating unit 91 from escaping from the receiving portion 87.

[0070] As shown in FIG. 4, the escape-preventing unit 88 has therein an escape-preventing through-hole 881 so as to allow the rotating shaft 67 to penetrate the escape-preventing unit 88.

[0071] The escape-preventing unit 88 is rotatably supported by the connecting body 81 via a bearing 89 disposed between the lower side of the escape-preventing

unit 88 and the upper side of the connecting body 81. In this case, the escape-preventing unit 88 is kept in contact with the bearing 89 by a fastening member 883.

[0072] The fastening member 883 may be a nut, which is engaged with the circumferential surface of the rotating shaft 67 and presses the escape-preventing unit 88 toward the bearing 89.

[0073] As shown in FIG. 5, when the operating unit 91 reaches the upper end of the receiving portion 87, the first stopper 95 serves to block the movement of the operating unit 91, thereby allowing the rotational force of the rotating shaft 67 to be transmitted to the connecting body 81.

[0074] The first stopper 95 may be an oilless bearing, which is supported by the escape-preventing unit 88. The oilless bearing is a device capable of minimizing frictional force between a moving object and a fixed object without supplying a lubricant to a friction surface. The oilless bearing may be formed in the shape of a ring.

[0075] In the case in which the first stopper 95 is a ring-shaped oilless bearing and in which the rotating shaft 67 penetrates the center of the oilless bearing, the first stopper 95 may serve to transmit the rotational force of the rotating shaft 67 to the connecting body 81, and may also serve as a bearing to support the rotating shaft 67 so that the rotating shaft 67 is rotatable within the connecting body 81.

[0076] When the operating unit 91 reaches the lower end of the receiving portion 87, the second stopper 96 serves to block the movement of the operating unit 91, thereby allowing the rotational force of the rotating shaft 67 to be transmitted to the connecting body 81. The second stopper 96 may be a ring-shaped oilless bearing, which is supported by a stepped portion 871.

[0077] Alternatively, the first stopper 95 and the second stopper 96 may be formed to have the configurations illustrated in FIG. 6.

[0078] The first stopper 95 illustrated in FIG. 6 may be a spring that is disposed between the escape-preventing unit 88 and the operating unit 91, and the second stopper 96 may be a spring that is disposed between the stepped portion 871 and the operating unit 91.

[0079] In this case, the first stopper 95 may be configured to provide force to the operating unit 91 so that the operating unit 91 moves away from the escape-preventing unit 88, and the second stopper 96 may be configured to provide force to the operating unit 91 so that the operating unit 91 moves away from the stepped portion 871.

[0080] The above embodiments have been described as including the first stopper 95 and the second stopper 96 in addition to the escape-preventing unit 88 and the stepped portion 871, which may perform the function of restricting the movement of the operating unit 91. However, in the case in which the escape-preventing unit 88 and the stepped portion 871 are provided, at least one of the first stopper or the second stopper may be omitted.

[0081] Hereinafter, the operation of the laundry treatment apparatus 100 having the above configuration will be described. Although, for convenience of explanation, FIG. 5 illustrates the state in which the operating unit 91 is located in the middle of the receiving portion 87, a description will be made hereinbelow of the state in which the initial position of the operating unit 91 is a position at which the operating unit 91 is in contact with the second stopper 96.

[0082] When electric current forming a magnetic field for realizing clockwise rotation is supplied to the stator 71, the rotor 73 and the rotating shaft 67 may be rotated in the clockwise direction.

[0083] When the rotating shaft 67 is rotated in the clockwise direction, the agitator 6, which is secured to the free end of the rotating shaft, may be rotated in the clockwise direction within the drum 4.

[0084] When the rotating shaft 67 is rotated, the escape-preventing unit 88 may also be rotated therewith. However, since the escape-preventing unit 88 is rotatably supported by the connecting body 81 via the bearing 89, the drum 4, which is secured to the connecting body 81, is prevented from being rotated.

[0085] When the agitator 6 is rotated within the drum by the rotation of the rotating shaft 67, the operating unit 91 is moved toward the first stopper 95 by the transfer unit 93. Accordingly, after the rotating shaft 67 has rotated a predetermined number of times (a reference number of times) (after the agitator has rotated a predetermined number of times), the operating unit 91 may come into contact with the first stopper 95.

[0086] When the operating unit 91 comes into contact with the first stopper 95, the rotating shaft 67 and the connecting body 81 are connected to each other via the operating unit 91 and the first stopper 95, and thus the connecting body 81 is rotated together with the rotating shaft 67. Accordingly, the drum 4 may be rotated together with the agitator 6 in the same direction.

[0087] The reference number of times that only the agitator 6 rotates may be variously set by appropriately configuring the transfer unit 93. In consideration of improvement of washing performance using the agitator, the reference number of times may be set such that the drum 4 is rotated after the agitator 6 has completely rotated at least once.

[0088] When electric current forming a magnetic field for realizing counterclockwise rotation is supplied to the stator 71, both the rotor and the rotating shaft 67 may be rotated in the counterclockwise direction.

[0089] In this case, the agitator 6 is rotated in the counterclockwise direction within the drum by the counterclockwise rotation of the rotating shaft 67, whereas the drum 4 is not rotated but remains stationary until the operating unit 91 comes into contact with the second stopper 96.

[0090] Subsequently, when the operating unit 91 comes into contact with the second stopper 96 after the rotating shaft 67 has rotated a predetermined number of times, the drum 4 may be rotated together with the agitator 6 in the counterclockwise direction.

[0091] Although the configurations or functions of the driving unit 7, the connecting unit 8 and the power transmission unit 9 have been described above with reference to the configuration in which the tub is disposed in the drawer retractably provided in the cabinet, the driving unit, the connecting unit and the power transmission unit may also be applied to a laundry treatment apparatus not including the drawer.

[0092] That is, the driving unit 7, the connecting unit 8 and the power transmission unit 9 may also be applied to a laundry treatment apparatus including a cabinet, a tub secured to the inside of the cabinet, and a drum rotatably provided in the tub.

[0093] 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

1. A laundry treatment apparatus comprising:

a tub for containing water, the tub comprising an introduction port through which laundry is introduced into or taken out of the tub;
a drum provided in the tub, the drum containing the laundry supplied thereto through the introduction port;
an agitator rotatably provided in the drum;
a rotating shaft penetrating the tub and the drum so as to be connected to the agitator;
a driving unit for rotating the rotating shaft;
a connecting unit comprising a connecting body secured to the drum and a body through-hole formed through the connecting body so as to allow the rotating shaft to be inserted thereinto; and
a power transmission unit configured so as to move reciprocatingly within the body through-hole when the rotating shaft rotates, the power transmission unit transmitting power provided by the rotating shaft to the connecting body after the rotating shaft has rotated a predetermined number of times.

2. The laundry treatment apparatus according to claim 1, wherein the power transmission unit comprises:

a first stopper and a second stopper secured to the body through-hole, the first stopper and the second stopper being spaced apart from each other by a predetermined distance;
an operating unit located in the body through-hole, the operating unit being configured to move reciprocatingly between the first stopper and the second stopper;
a through-hole formed through the operating unit so as to allow the rotating shaft to be inserted thereinto;
a first thread provided in the through-hole; and
a second thread provided at the rotating shaft so as to mesh with the first thread, the second thread moving the operating unit toward the first stopper or the second stopper when the rotating shaft rotates.

3. The laundry treatment apparatus according to claim 2, further comprising:
a receiving portion formed in the connecting body, the receiving portion having a diameter that is greater than a diameter of the body through-hole and defining a moving path of the operating unit.

4. The laundry treatment apparatus according to claim 3, further comprising:
an escape-preventing unit for preventing the operating unit from escaping from the receiving portion, the escape-preventing unit being rotatably supported by the connecting body and being configured to allow the rotating shaft to pass therethrough.

5. The laundry treatment apparatus according to claim 4, wherein the first stopper is an oilless bearing that is supported by the escape-preventing unit and is configured to allow the rotating shaft to pass therethrough, and
wherein the second stopper is an oilless bearing that is supported by the stepped portion and is configured to allow the rotating shaft to pass therethrough.

6. The laundry treatment apparatus according to claim 5, wherein the first stopper is a spring located between the escape-preventing unit and the operating unit so as to provide force to the operating unit so that the operating unit moves away from the escape-preventing unit, and
wherein the second stopper is a spring located between the stepped portion and the operating unit so as to provide force to the operating unit so that the operating unit moves away from the stepped portion.

7. The laundry treatment apparatus according to claim 3, wherein the first stopper is an escape-preventing unit for preventing the operating unit from escaping from the receiving portion, the escape-preventing unit being rotatably supported by the connecting body and being configured to allow the rotating shaft to pass therethrough.

8. The laundry treatment apparatus according to claim 3, wherein the second stopper is a stepped portion formed between the receiving portion and the body

through-hole.

9. The laundry treatment apparatus according to any one of claims 1 to 8, further comprising:

a cabinet comprising an entrance formed therein; and
a drawer to which the tub is secured, the drawer being retractable from the cabinet through the entrance.

10. The laundry treatment apparatus according to claim 9, wherein the rotating shaft penetrates a lower surface of the tub and a lower surface of the drum and is secured to the agitator.

11. The laundry treatment apparatus according to claim 10, wherein the rotating shaft is arranged perpendicular to a ground on which the cabinet is seated.

12. The laundry treatment apparatus according to claim 10, wherein the driving unit comprises:

a stator secured to the lower surface of the tub while being located outside the tub, the stator being configured to generate a rotating magnetic field; and
a rotor configured to be rotated by the rotating magnetic field generated by the stator, and
wherein the rotating shaft is secured to the rotor.

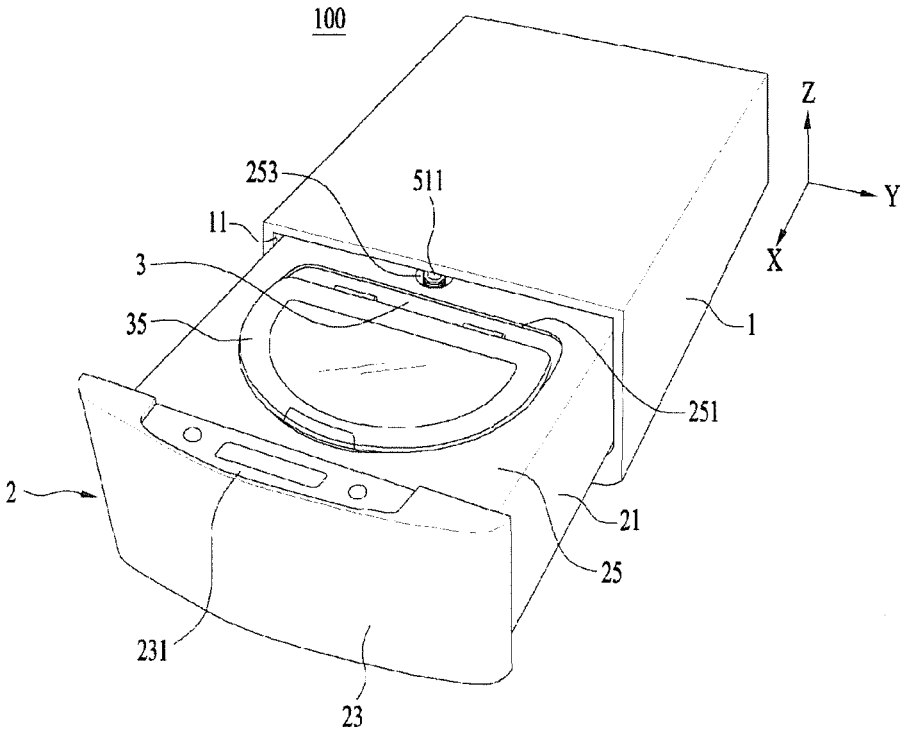
13. The laundry treatment apparatus according to claim 10, wherein the agitator comprises:

a body disposed in the drum so as to be secured to the rotating shaft, the body being formed in a shape of a circular plate arranged parallel to the lower surface of the drum; and
an arm protruding from the body toward the introduction port.

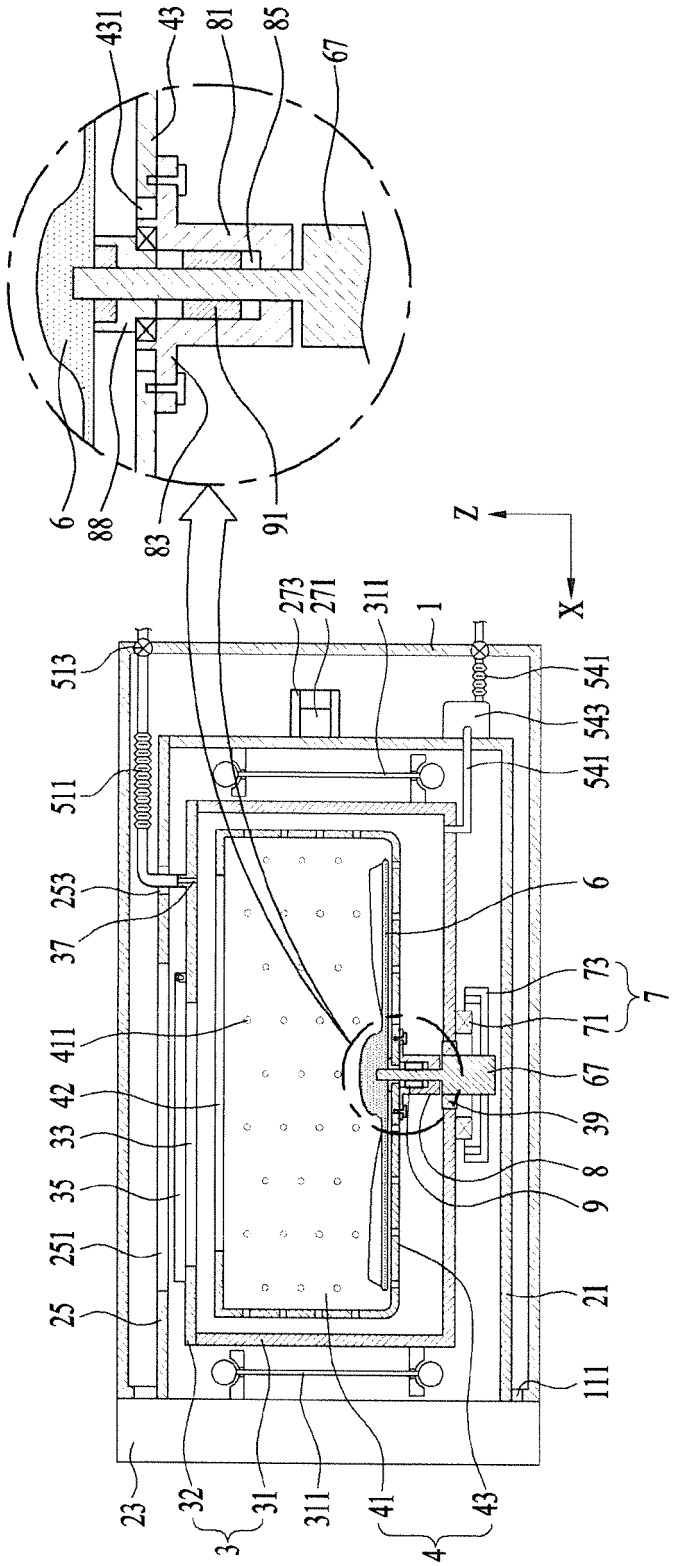
14. The laundry treatment apparatus according to claim 13, further comprising:

a communication hole formed through the lower surface of the drum so that an inside of the drum communicates with an inside of the tub therethrough; and
an agitator through-hole formed through the body.

【Fig. 1】



【Fig. 2】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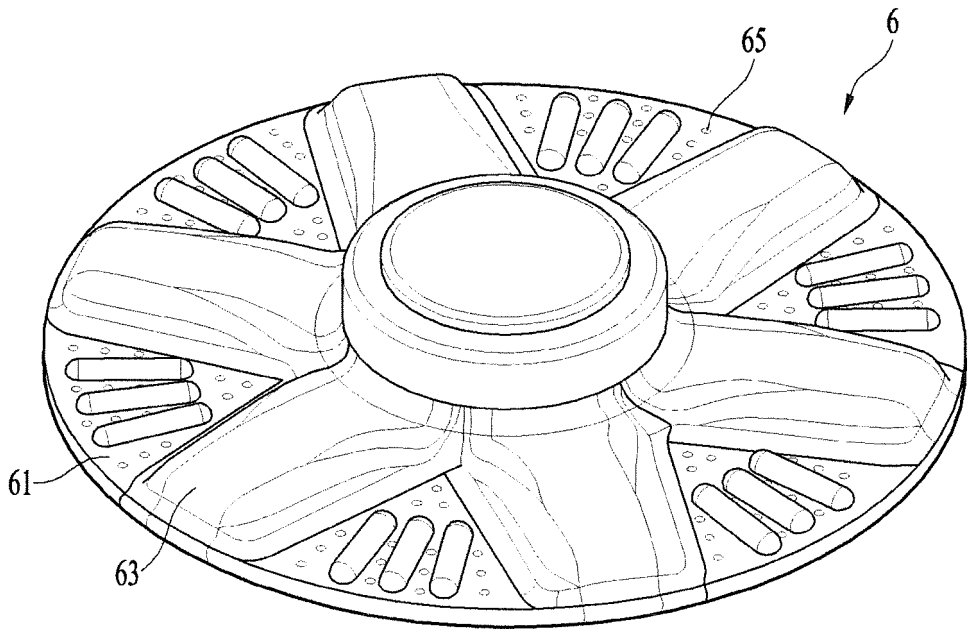
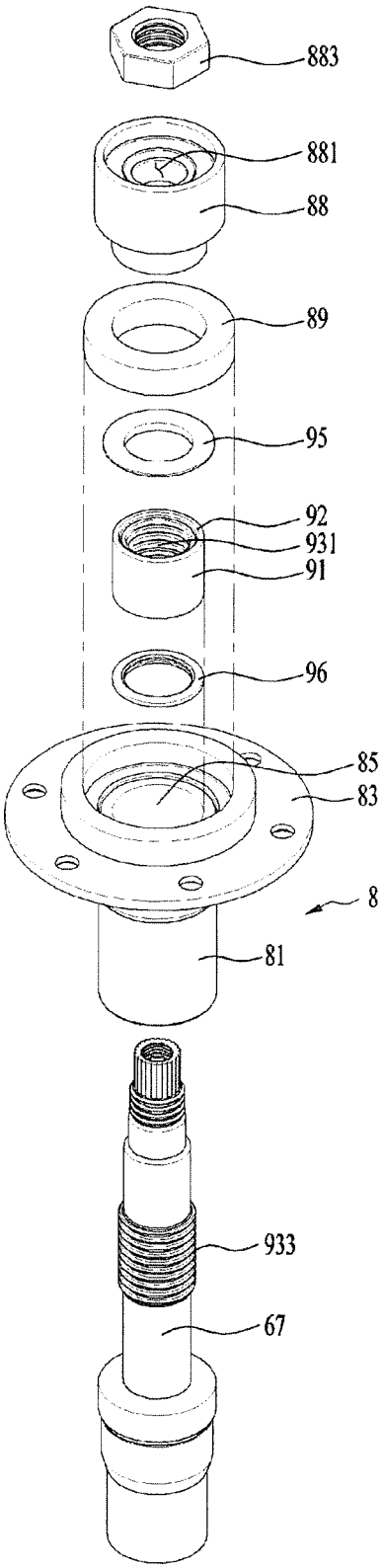
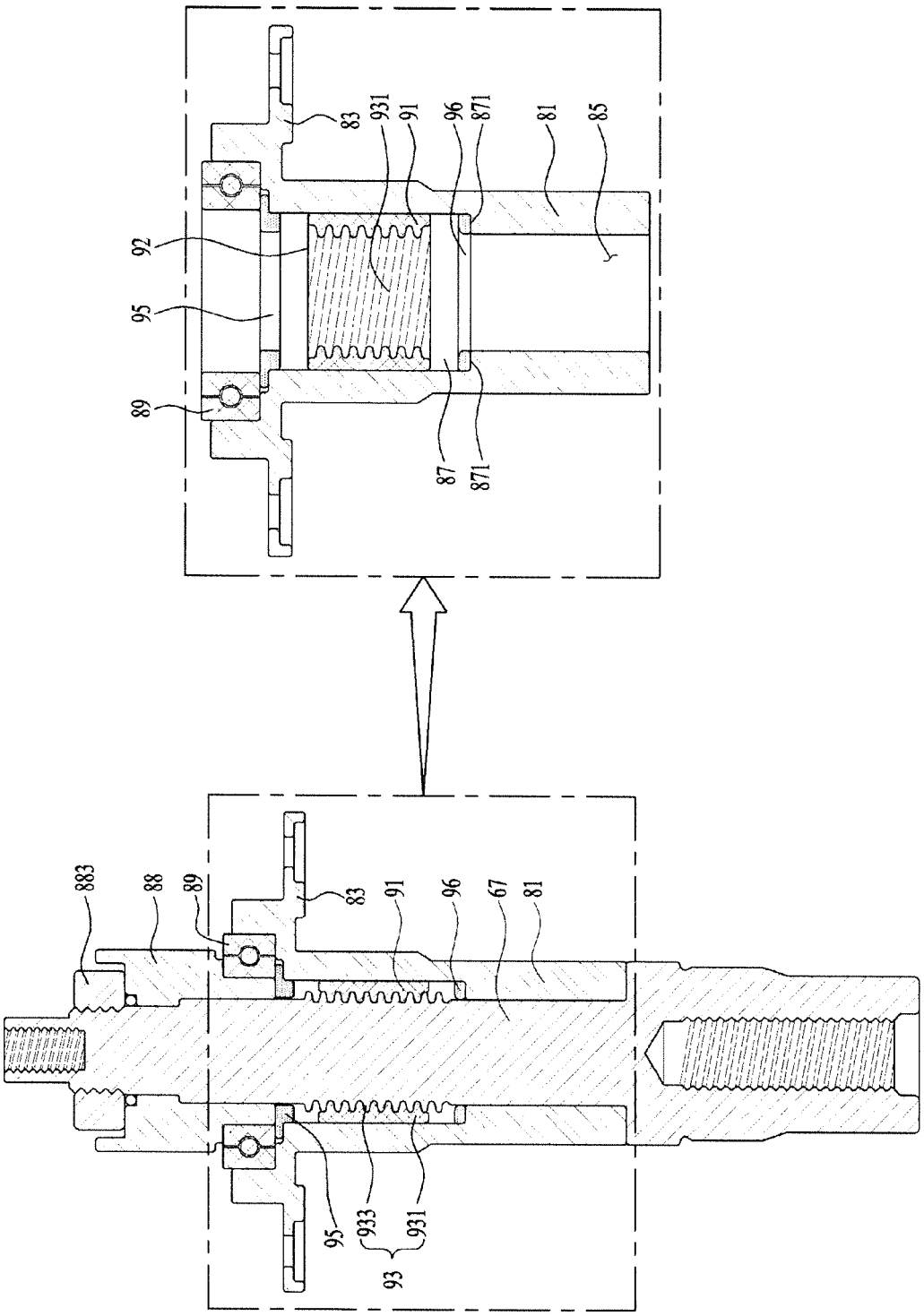
【Fig. 3】



【Fig. 4】



【Fig. 5】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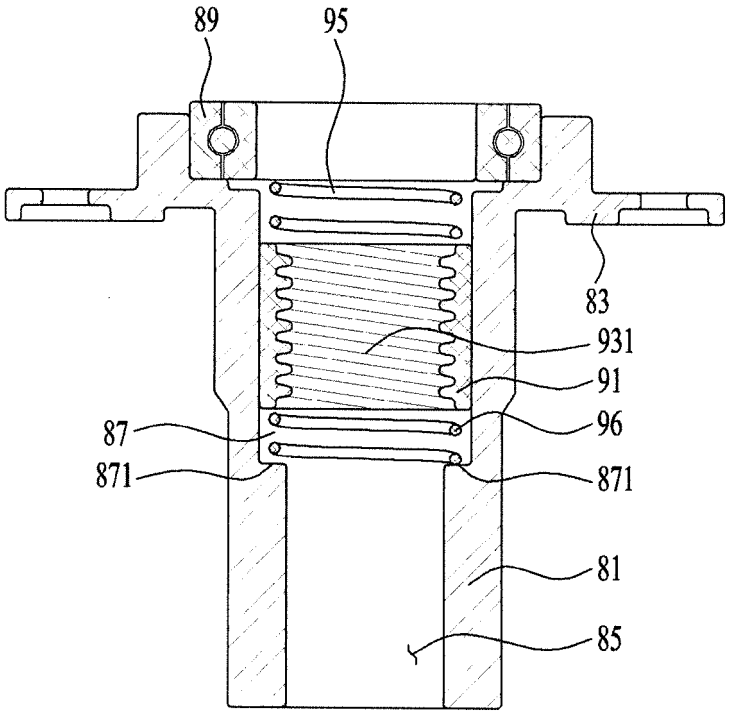
【Fig. 6】



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2017/000041

A. CLASSIFICATION OF SUBJECT MATTER

D06F 37/40(2006.01)i, D06F 37/24(2006.01)i, D06F 37/12(2006.01)i

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 37/40; D06F 39/00; H02K 21/22; H02K 21/12; D06F 37/00; D06F 37/30; D06F 17/06; D06F 37/12; D06F 37/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS (KIPO internal) & Keywords: power, delivery, tub, drum, agitating part, rotary shaft, reciprocating, drawer, bearing

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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A	KR 10-2008-0065765 A (LG ELECTRONICS INC.) 15 July 2008 See paragraph [0060]; and figures 3-4.	1-14
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"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
14 APRIL 2017 (14.04.2017)	**14 APRIL 2017 (14.04.2017)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. +82-42-481-8578	Authorized officer Telephone No.

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