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Jeong et al.

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(54) **LAUNDRY TREATMENT APPARATUS**

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(73) Assignee: **LG Electronics Inc.**, Seoul (KR)

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(58) **Field of Classification Search**
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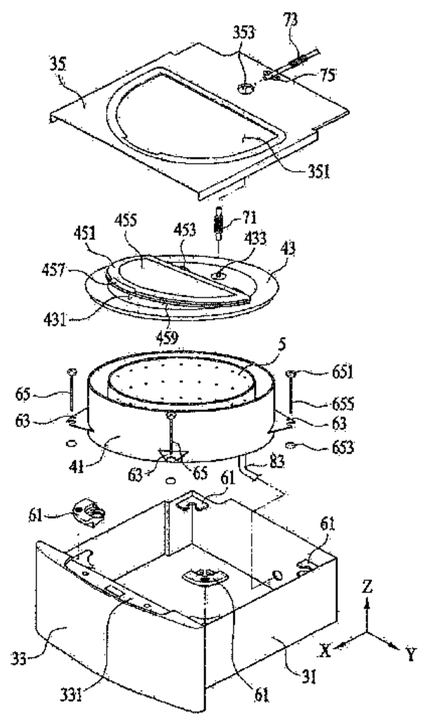
(57) **ABSTRACT**

A laundry treatment apparatus includes a tub body configured to store water, a tub cover configured to define an upper surface of the tub body, an introduction aperture defined through the tub cover, a supply aperture provided in the tub cover, and configured to enable supply of water into the tub body, a drum that is rotatably provided in the tub body, and that is configured to receive laundry, the drum including an opening in communication with the introduction aperture, a door configured to open and close the introduction aperture, and an ejection unit configured to eject water introduced into the supply aperture to at least one of the door or to the drum.

20 Claims, 7 Drawing Sheets



(51) **Int. Cl.**

D06F 39/12	(2006.01)
D06F 39/14	(2006.01)
D06F 37/18	(2006.01)
D06F 37/26	(2006.01)
D06F 39/04	(2006.01)
D06F 23/04	(2006.01)

(52) **U.S. Cl.**
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(58) **Field of Classification Search**
CPC D06F 37/18; D06F 37/26; D06F 37/28; D06F 39/08; D06F 39/088; D06F 39/12; D06F 39/14
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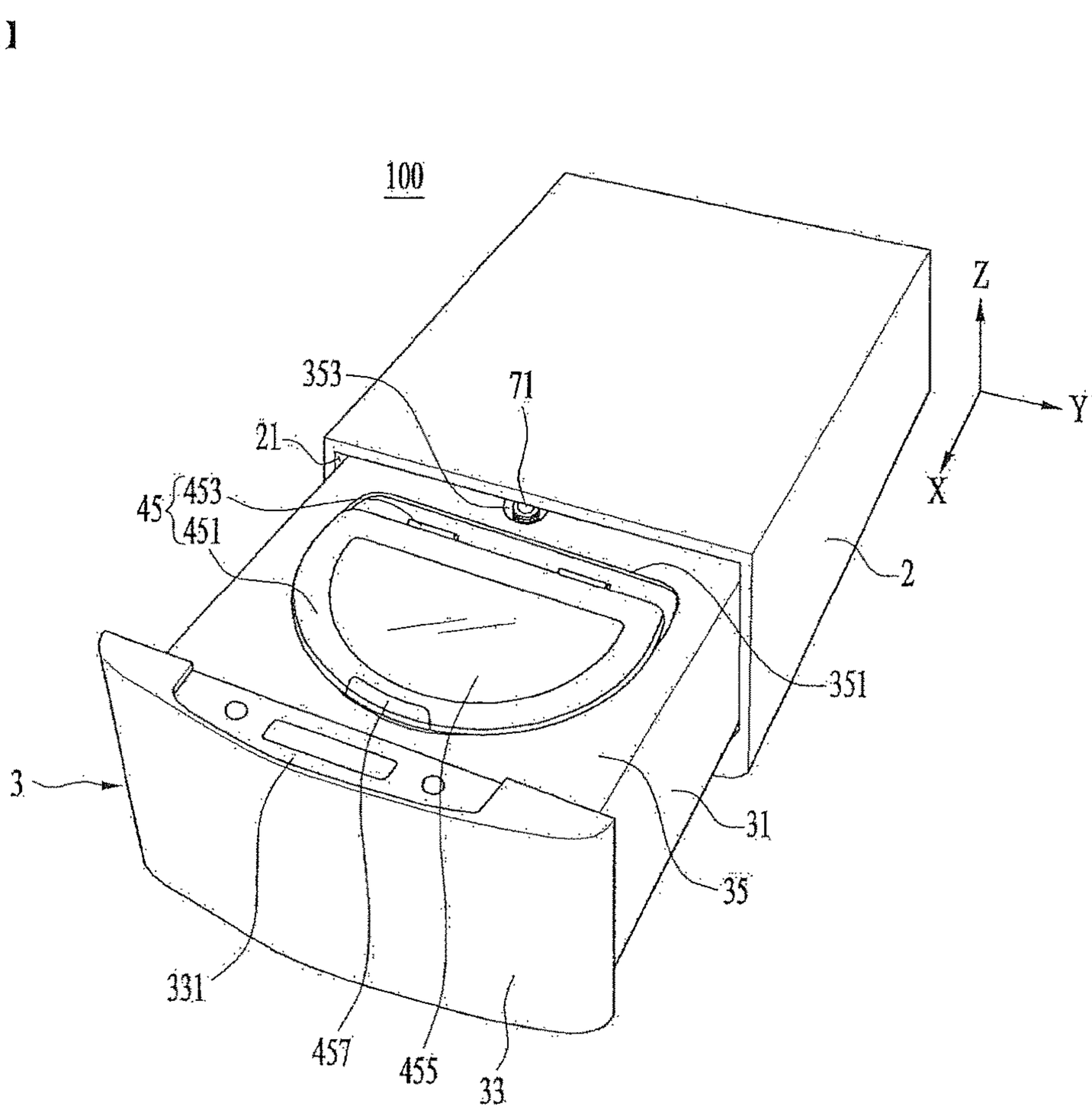
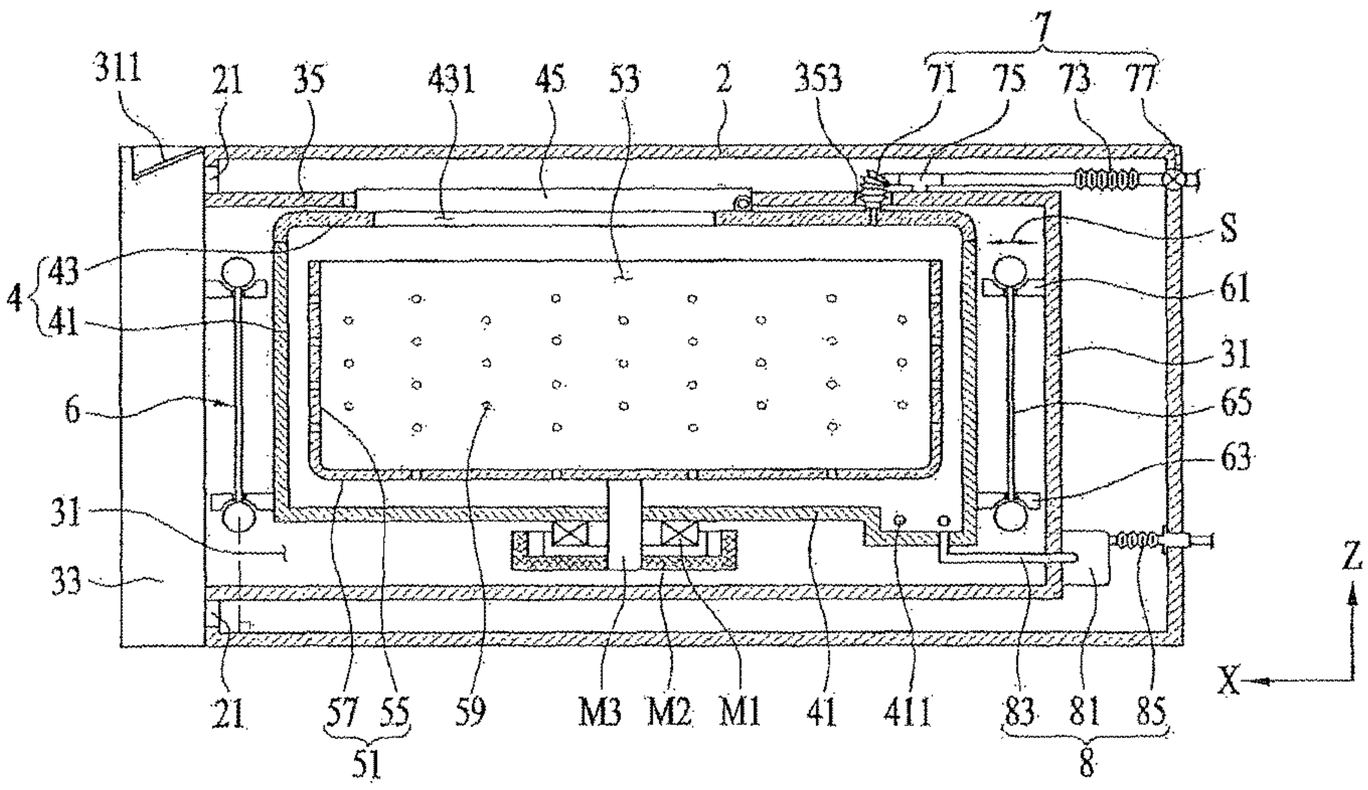
【FIG 1】



【 FIG 2】


311
21
35
431
45
53
2
353
7
71
75
73
77
S
61
31
65
63
4
43
41
6
31
33
21
57
55
59
M3
M2
M1
41
411
83
81
85
51
8
Z
X

【 FIG 3】

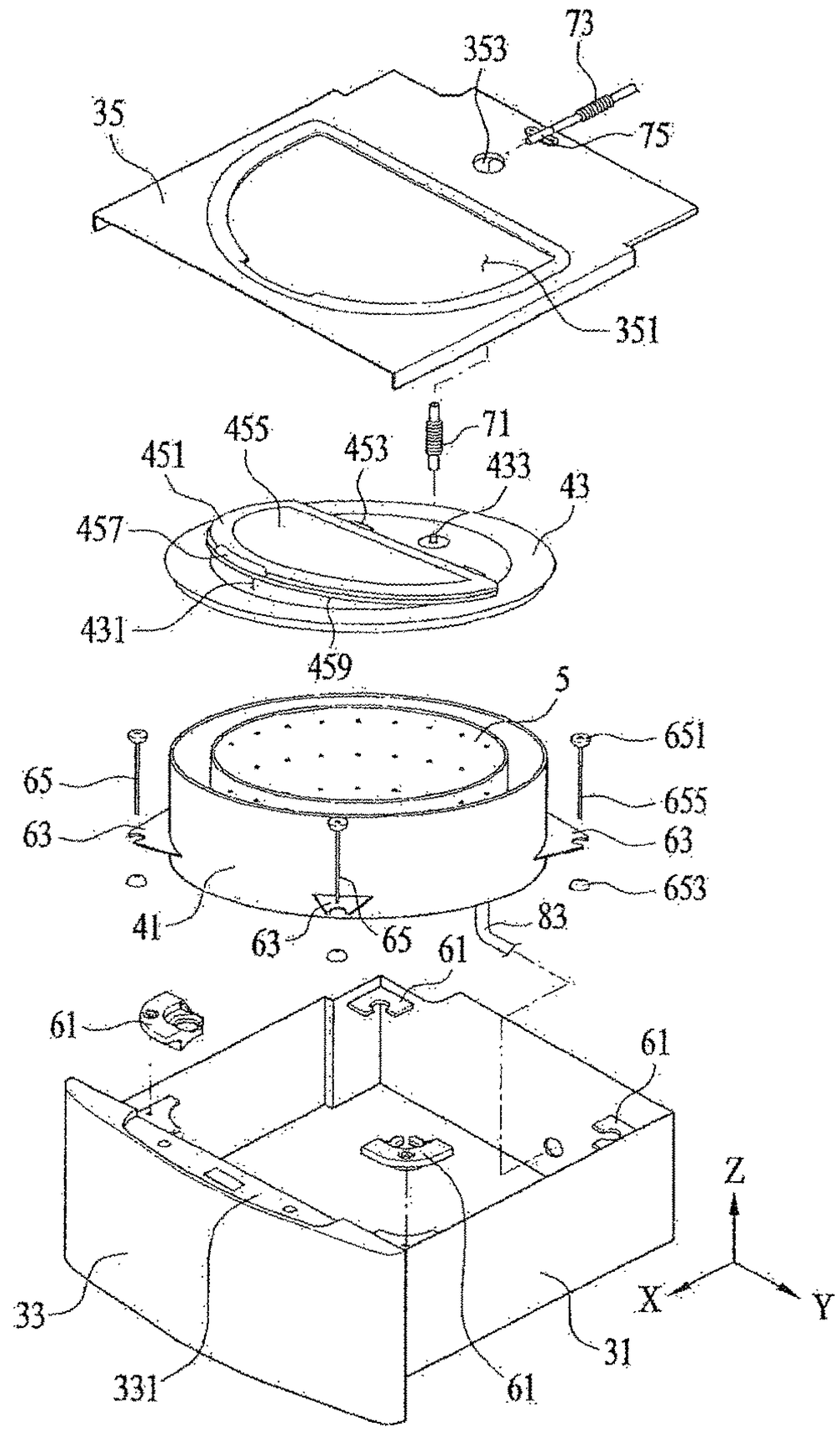

353
73
35
75
351
71
455
451
453
433
43
457
431
459
5
651
65
655
63
63
653
41
63
65
61
83
61
61
Z
X
Y
33
331
61
31

FIG. 4A

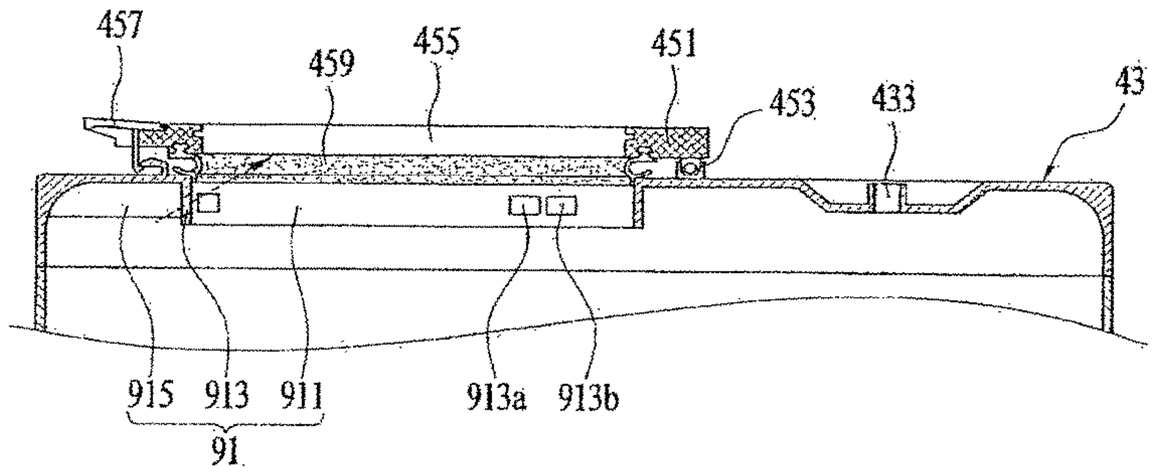

457
459
455
451
453
433
43
915
913
911
913a
913b
91

FIG. 4B

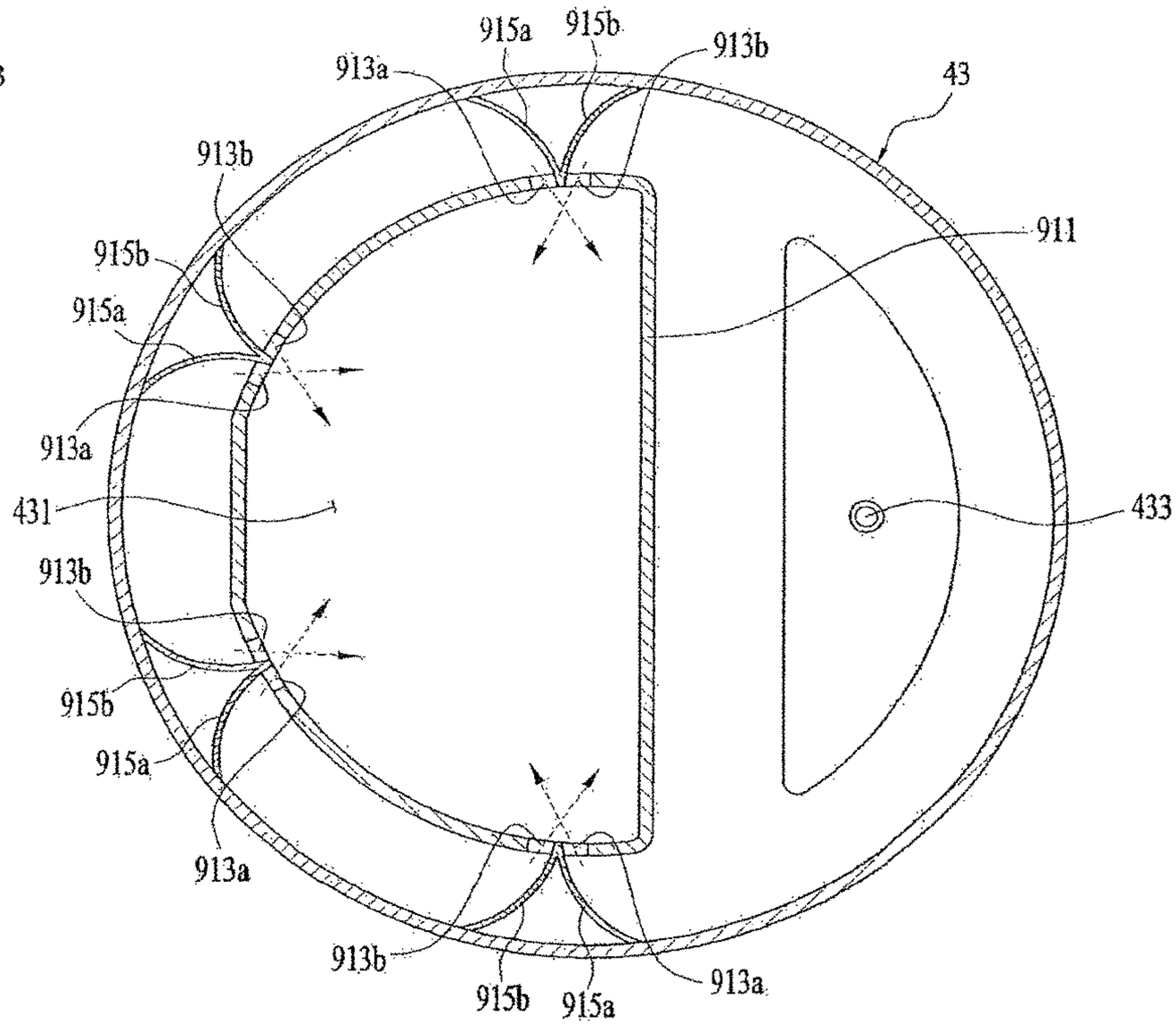

915a
915b
913b
913a
43
911
433
431

FIG. 5A

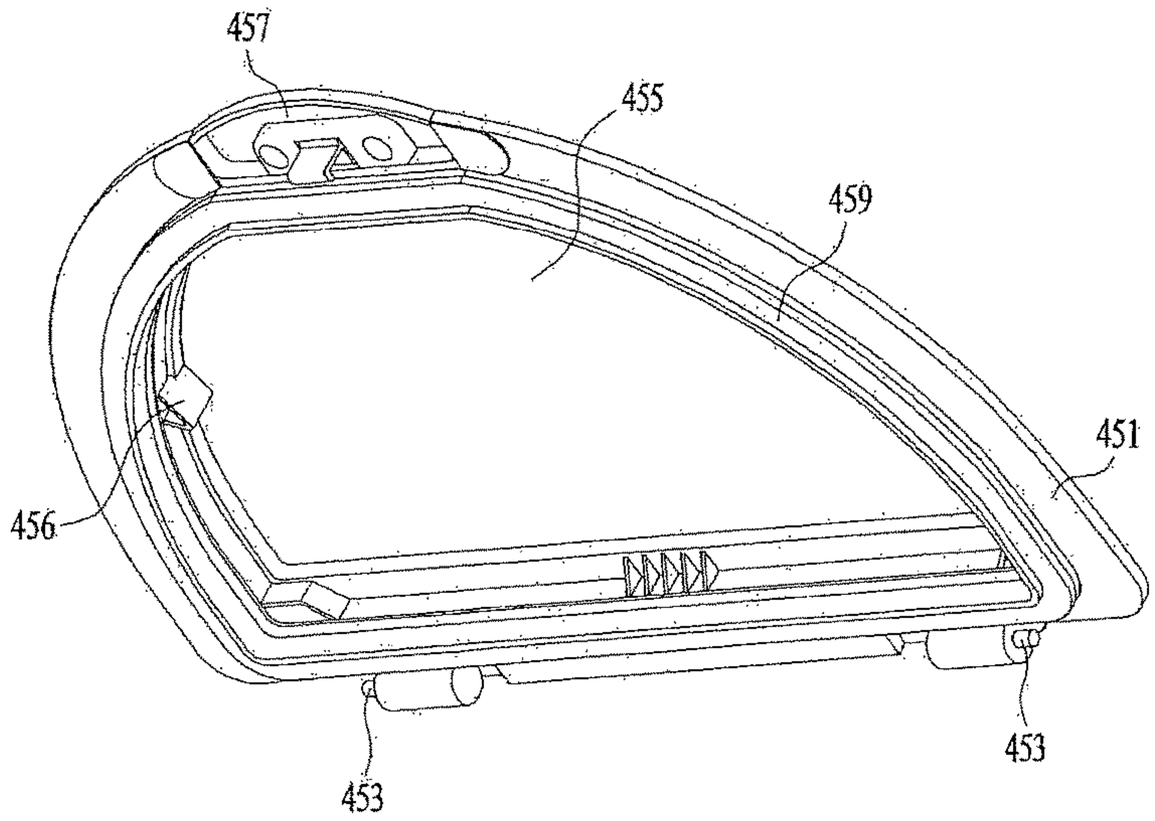
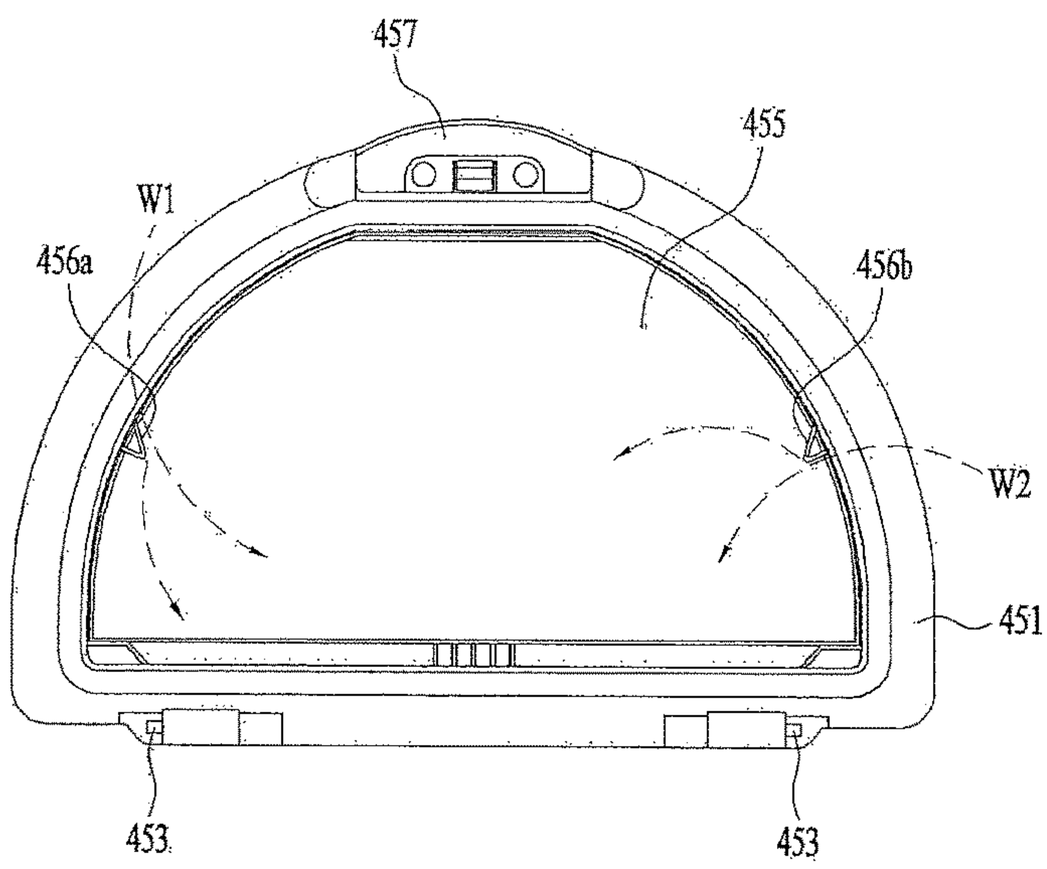


FIG. 5B



【 FIG 6】

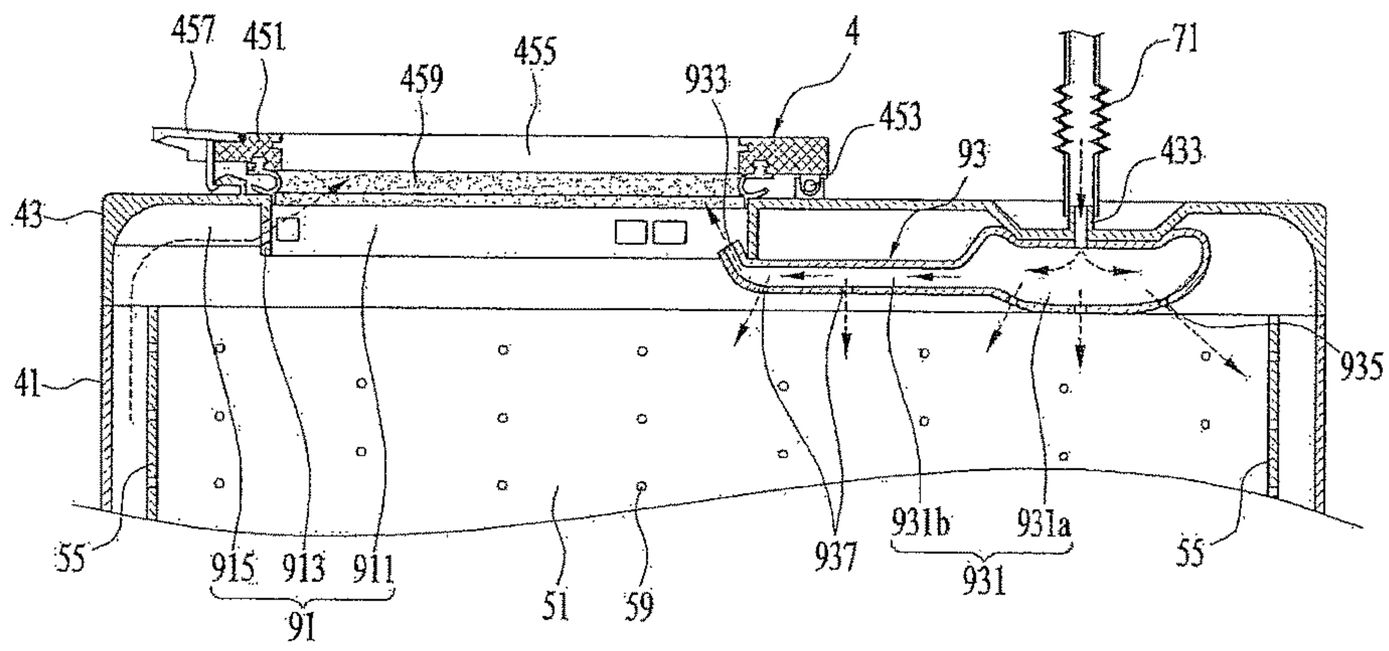

457
451
459
455
933
4
453
71
433
93
43
41
935
55
915
913
911
91
51
59
937
931b
931a
931
55

FIG. 7A

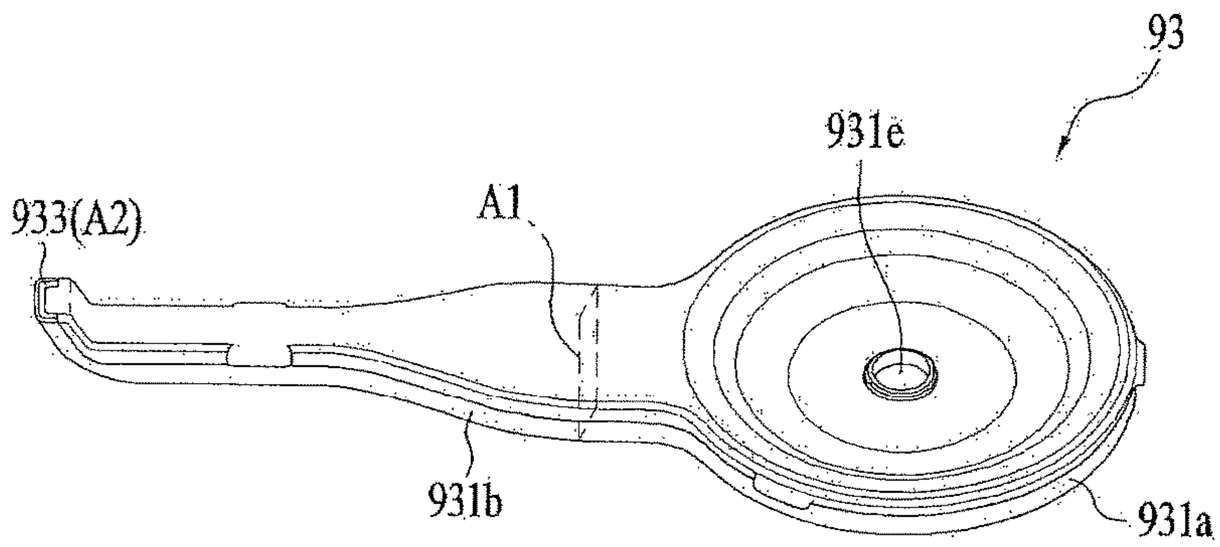
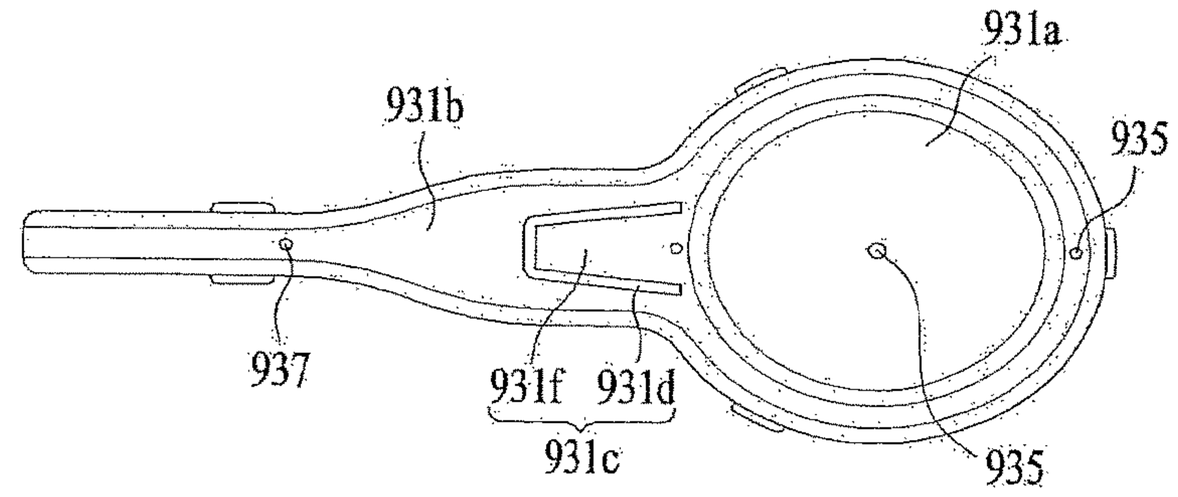

93
931e
933(A2)
A1
931b
931a

FIG. 7B


931a
931b
935
937
931f
931d
931c
935

LAUNDRY TREATMENT APPARATUS

This application is a continuation of U.S. application Ser. No. 15/197,823, filed Jun. 30, 2016, now pending, which claims the benefit of Korean Patent Application No. 10-2015-0092774, filed on Jun. 30, 2015 and Korean Patent Application No. 10-2016-0073976, filed on Jun. 14, 2016, both of which are hereby incorporated by reference as if fully set forth herein.

BACKGROUND

Generally, a laundry treatment apparatus is a generic term for an apparatus that washes laundry (e.g., objects to be washed or objects to be dried), an apparatus that dries laundry, and an apparatus that may perform both washing and drying of laundry.

Conventional laundry treatment apparatuses are classified into front loading type laundry treatment apparatuses which are configured such that laundry is introduced through an introduction aperture formed in the front surface of the apparatus and top loading type laundry treatment apparatuses configured such that laundry is introduced through an introduction aperture formed in the upper surface of the apparatus.

A top loading type laundry treatment apparatus includes a tub having an introduction aperture formed in the upper surface of the apparatus, a drum rotatably provided inside the tub, and a door for opening and closing the introduction aperture.

Some conventional laundry treatment apparatuses having the configuration described above are devised to have a minimum volume in order to wash only a very small amount of laundry. Such a laundry treatment apparatus having a minimum volume has the feature of a very small distance between the introduction aperture and the upper end of the drum.

Impurities which are generated inside the tub when the drum is rotated to wash laundry may remain on the door. That is, because a water stream is generated inside the tub while the drum is rotated, there is the possibility that bubbles, which are generated as the detergent are dissolved, or contaminants discharged from the laundry during washing may remain on the door or inside the drum after the washing is completed.

In addition, in the conventional laundry treatment apparatus, when the bubbles or contaminants remain on the inner surface of the door or on the circumferential surface of the drum despite the completion of washing, a user may erroneously determine that the washing of laundry is not completed or may suspect the failure of the laundry treatment apparatus.

In the conventional laundry treatment apparatus, it is not necessary to minimize the volume of the laundry treatment apparatus, with the result that the tub is relatively high, and the wash water is not stored up to the upper surface of the tub. Even when bubbles are generated, therefore, consideration may not be given to the fact that the bubbles may be stuck to the door. Bubbles or impurities generated during washing of laundry may remain on the door, with the result that the bubbles or the impurities may be stuck to the laundry after the washing is completed, thereby reducing washing efficiency.

In the conventional laundry treatment apparatus, when the pressure of the wash water flowing in the additional flow channel is excessively increased, the flow channel may be broken, with the result that the wash water may leak or the wash water may flow backward. The conventional laundry treatment apparatus does not prevent bubbles from being generated in the drum.

SUMMARY

According to one aspect, a laundry treatment apparatus may include a tub body configured to store water, a tub cover configured to define an upper surface of the tub body, an introduction aperture defined through the tub cover, a supply aperture provided in the tub cover, and configured to enable supply of water into the tub body, a drum that is rotatably provided in the tub body, and that is configured to receive laundry, the drum including an opening in communication with the introduction aperture, a door configured to open and close the introduction aperture, and an ejection unit configured to eject water introduced into the supply aperture to at least one of the door or to the drum.

Implementations according to this aspect may include one or more of the following features. For example, the ejection unit may include a chamber configured to guide water supplied through the supply aperture toward the introduction aperture, and a chamber discharge unit configured to discharge water introduced into the chamber to the door. The chamber may include an inlet chamber located under the supply aperture, and a connection chamber configured to guide water introduced into the inlet chamber to the chamber discharge unit. A cross-sectional area of the connection chamber may be smaller than a cross-sectional area of the inlet chamber. A cross-sectional area of the chamber discharge unit may be smaller than a cross-sectional area of the connection chamber. The door may be located above the introduction aperture, and the connection chamber may be configured to tilt to allow water discharged from the chamber discharge unit to be supplied to the door. The door may include a frame rotatably coupled to the tub cover and a window provided in the frame, the window comprising a transparent material, and the connection chamber may be configured to tilt to allow water discharged from the chamber discharge unit to be supplied to the window. The chamber further may include an inlet chamber discharge unit that is defined through the inlet chamber and that is configured to eject water to the drum. The drum may include a cylindrical drum body with the opening defined at an upper surface of the drum, and the inlet chamber discharge unit may be configured to eject water toward at least one of a bottom surface or and a circumferential surface of the drum body. The chamber may further include a connection chamber discharge unit that is defined through the connection chamber and that is configured to eject water to the drum. The drum may include a cylindrical drum body with the opening defined at an upper surface of the drum, and the connection chamber discharge unit may include a plurality of connection chamber discharge units, at least one of the connection chamber discharge units being configured to eject water to a circumferential surface of the drum body. The chamber may further include a pressure reduction unit provided in at least one of the inlet chamber or the connection chamber, the pressure reduction unit being configured to discharge water from the chamber to the drum based on a pressure in the chamber being equal to or greater than a predetermined reference pressure.

The laundry treatment apparatus may include a rotating shaft configured to rotate the drum, and a one or more washing unit configured to eject at least some water moved toward the tub cover to the door using centrifugal force generated while the drum is rotated. The rotating shaft may

be configured to extend from a bottom surface of the tub body toward the introduction aperture. The washing unit may include a guide that extends from an edge of the tub cover toward the introduction aperture. The washing unit may further include a discharge unit configured to discharge water supplied through the guide in a direction in which the door is located. The washing unit may include a plurality of washing units, at least two of the washing units being arranged to face each other. The guide may include a first guide configured to guide water moved to the tub cover to the discharge unit based on the drum being rotated in a clockwise direction, and a second guide configured to guide water moved to the tub cover to the discharge unit based on the drum being rotated in a counterclockwise direction. The washing unit may further include a barrier that protrudes from the tub cover toward an upper surface of the drum, and the discharge unit may include a first discharge unit that is defined through the barrier and that is configured to discharge water supplied through the first guide, and a second discharge unit that is defined through the barrier and that is configured to discharge water supplied through the second guide. Each of the first discharge unit and the second discharge unit is inclined such that a path of water discharged from the first discharge unit and a path of water discharged from the second discharge unit cross each other. The laundry treatment apparatus may further include a cabinet, and a drawer configured to support the tub body. The laundry treatment apparatus may further include a rotating shaft configured to rotate the drum, where the door includes a frame rotatably coupled to the tub cover, a window provided in the frame such that an inside of the tub body is visible from an outside of the tub body, and a washing guide configured to guide at least some water moved to an edge of the frame to the window using centrifugal force generated while the drum is rotated. An end of the introduction aperture may be concavely bent toward the drum, and an upper part of the inlet chamber may correspond to a shape of the introduction aperture such that the upper part of the inlet chamber is configured to receive the end of the introduction aperture based on the upper part of the inlet chamber being in contact with the end of the introduction aperture. The inlet chamber discharge unit may be provided in an edge of a lower part of the inlet chamber and in a middle portion of the lower part of the inlet chamber. The pressure reduction unit may include a chamber through-hole defined through one of the inlet chamber or the connection chamber, and an elastic body provided in the chamber through-hole that is configured to open the chamber through-hole based on pressure applied to the chamber through-hole being equal to or greater than a reference pressure. The elastic body may be configured to have one end connected to the inlet chamber and the other end separate from the connection chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1** and **2** are views illustrating an example of a laundry treatment apparatus;

FIG. **3** is a view illustrating an example of the coupling relationship between a drawer, a tub, and a drum;

FIGS. **4**A and **4**B are views illustrating an example of an ejection unit

FIGS. **5**A and **5**B are views illustrating an example of a washing guide and

FIGS. **6** to **7**B are views illustrating a second example of an ejection unit.

DETAILED DESCRIPTION

As illustrated in FIGS. **1** and **2**, a laundry treatment apparatus **100** may include a cabinet **2**, a drawer **3** provided to be discharged from the cabinet **2**, a tub **4** provided inside the drawer **3** for storing water therein, and a drum **5** rotatably provided inside the tub **4** for storing laundry therein.

The cabinet **2** may serve to define the external appearance of the laundry treatment apparatus **100**, and may also simply serve as a space in which the drawer **3** is received. The cabinet **2** may be provided in the front surface of the apparatus with an opening **21** for the insertion of the drawer **3**.

The drawer **3** includes a drawer body **31** configured to be inserted into the inside of the cabinet **2** through the opening **21**, a drawer panel **33** fixed to the front surface of the drawer body **31** for opening and closing the opening **21**, and a drawer cover **35** for forming the upper surface of the drawer body **31**.

Because the drawer panel **33** is fixed to the front surface of the drawer body **31**, the drawer panel **33** may serve as a handle for discharging the drawer body **31** from the cabinet **2**.

The drawer panel **33** may be provided with a control panel **331**, which is used to input a control command associated with the operation of the laundry treatment apparatus **100** and to notify a user of a message associated with the operation of the laundry treatment apparatus **100**.

The drawer body **31** may have any shape that can be inserted into the cabinet **2** through the opening **21** and can provide a space in which the tub **4** is received. FIG. **1** illustrates a hollow drawer body **31** having a hexahedral shape by way of example.

The drawer cover **35** has a first through-hole **351** and a second through-hole **353** for communicating the inside of the drawer body **31** with the outside. The first through-hole **351** may be provided for the introduction and discharge of laundry, and the second through-hole **353** may be provided to supply water required to wash the laundry.

As illustrated in FIG. **2**, the tub **4** includes a tub body **41** located inside the drawer body **31** for storing water therein, and a tub cover **43** for forming the upper surface of the tub body **41**. The tub body **41** may take the form of a cylinder having an open upper surface. A heater **411** for heating water may be provided in the tub body **41**.

The tub cover **43** may have an introduction aperture **431** for communicating the inside of the tub body **41** with the outside of the tub body **41**, and a supply aperture **433** for introducing water into the tub body **41**.

The introduction aperture **431** may be provided under the first through-hole **351** provided in the drawer cover **35**, and the supply aperture **433** may be provided to communicate with the second through-hole **353** provided in the drawer cover **35**.

The introduction aperture **431** serves to allow laundry to be introduced into the tub body **41**, or serves to allow the laundry inside the tub body **41** to be discharged to the outside of the tub body **41**. The introduction aperture **431** is opened and closed by a door **45**.

As illustrated in FIG. **3**, the door **45** may include a frame **451** rotatably coupled to the tub cover **43** via a hinge **453**, a window **455** provided in the frame **451**, and a door handle **457** for separably coupling the frame **451** to the tub cover **43**. The window **455** may be formed of a transparent material to

allow the user to view the inside of the tub body **41** when the drawer **3** is discharged from the cabinet **2**.

Meanwhile, in order to prevent the water inside the tub body **41** from being discharged to the outside of the tub body **41** through the introduction aperture **431**, any one of the frame **451** and the tub cover **43** may be provided with a sealing unit **49** for hermetically sealing a space between the frame **451** and the introduction aperture **431** when the door **45** closes the introduction aperture **431**.

The tub **4** having the configuration described above is coupled to the drawer body **31** via a tub support unit **6**. The tub support unit **6** may include a first support member **61** provided at the drawer body **31**, a second support member **63** provided at the tub body **41**, and a connector **65** for connecting the first support member **61** and the second support member **63** to each other.

The connector **65** may include a first connection piece **651** configured to be seated in the first support member **61**, a second connection piece **653** for supporting the second support member **63**, and a bar **655** for connecting the first connection piece **651** and the second connection piece **653** to each other.

The first connection piece **651** may be shaped to be movable in the first support member **61** while being seated in the first support member **61**. The second connection piece **653** may be shaped to support the second support member **63** and to be movable in the second support member **63**.

As illustrated in FIG. **2**, the bar **655** may form a right angle with respect to the bottom surface of the cabinet **2** (i.e. may be provided parallel to the height direction Z of the cabinet **2** or provided to be orthogonal to the bottom surface of the drawer **3**).

At least three tub support units **6** are provided to couple the tub body **41** to the drawer body **31**, and the bars **655** form a right angle with respect to the bottom surface of the cabinet **2**. The distance between the tub cover **43** and the drawer cover **35** may be increased when compared to the case where the bars **655** are tilted at a prescribed angle relative to the Z-axis.

The tub support units **6** may reduce the possibility of the tub cover **43** colliding with the drawer cover **35** when the tub body **41** vibrates inside the drawer body **31**.

When the bars **655** are provided to form a right angle with respect to the bottom surface of the drawer **3**, at least one of the first support member **61** and the second support member **63** may be separably coupled to the drawer body **31**.

When at least three tub support units **6** are provided and both the first support member **61** and the second support member **63** are inseparable from the drawer body **31**, a user who attempts to fix the tub body **41** to the drawer body **31** first needs to insert the tub body **41** into the drawer body **31** to prevent the first support member **61** from interfering with the second support member **63**, and then needs to rotate the tub body **41** so that the second support member **63** and the first support member **61** are located on the vertical axis, in order to couple the first connection piece **651** to the first support member **61**.

Although the feature by which the bar **655** of the tub support unit **6** is provided to form a right angle with respect to the bottom surface of the drawer **3** serves to minimize the distance between the outer circumferential surface of the tub body **41** and the inner circumferential surface of the drawer body **31** to minimize the volume of the laundry treatment apparatus **100**, the strength of assembly of the first connection piece **651** and the first support member **61** may be deteriorated while the process described above is performed. This problem may be solved by making the first support member **61** separable from the drawer body **31**.

The drum **5**, which is provided inside the tub **4**, may include a cylindrical drum body **51** having an opening **53** formed in the upper surface thereof. The opening **53** is located below the introduction aperture **431**, and the laundry supplied through the introduction aperture **431** may be supplied to the drum body **51** through the opening **53**.

A plurality of drum through-holes **59** may be provided in the bottom surface **57** and the circumferential surface **55** of the drum body **51** for communication of the inside of the drum body **51** and the tub body **41**.

The drum body **51** may be rotated inside the tub body **41** by a drive unit. The drive unit may include a stator M1 located outside the tub body **41** and fixed to the bottom surface of the tub body **41**, a rotor M2 configured to be rotated by a rotating magnetic field provided by the stator M1, and a rotating shaft M3 penetrating the bottom surface of the tub body **41** for connecting the bottom surface **57** of the drum **5** and the rotor M3 to each other. The rotating shaft M3 may be provided to form a right angle with respect to the bottom surface of the tub body **41**.

The laundry treatment apparatus **100** may supply water to the tub **4** via a water supply unit **7**, and may discharge the water stored in the tub **4** to the outside of the cabinet **2** via a drain unit **8**.

As illustrated in FIG. **2**, the water supply unit **7** may include a first water supply pipe **71** connected to the supply aperture **433** formed in the tub cover **43**, a second water supply pipe **73** connected to a water supply source, which is located at the outside of the cabinet **2**, and a connection pipe **75** fixed to the tub cover **43** for connecting the first water supply pipe **71** and the second water supply pipe **73** to each other.

The first water supply pipe **71** may connect the supply aperture **433** and the connection pipe **75** to each other through the second through-hole **353** provided in the drawer cover **35**. The first water supply pipe **71** may be a corrugated pipe in order to prevent the first water supply pipe **71** from being separated from the connection pipe **75** when the tub **4** vibrates (see FIG. **3**).

In addition, the second water supply pipe **73** may also be a corrugated pipe in order to prevent the second water supply pipe **73** from being separated from the connection pipe **75** when the drawer **3** is discharged from the cabinet **2**. The second water supply pipe **73** may be opened and closed by a water supply valve **77**, which is controlled by a controller.

In some examples, the water supply unit **7** may include a single water supply pipe for connecting a water supply source, which is located at the outside of the cabinet **2**, to the supply aperture **433** provided in the tub cover **43**. In this example, the water supply pipe may be a corrugated pipe.

The drain unit **8** may include a drain pump **81** fixed to the drawer body **31**, a first drain pipe **83** for guiding the water inside the tub body **41** to the drain pump **81**, and a second drain pipe **85** for guiding the water discharged from the drain pump **81** to the outside of the cabinet **2**. The second drain pipe **85** may be a corrugated pipe.

In the laundry treatment apparatus **100**, after laundry is introduced into the drum **5** and water and detergent are supplied to the tub **4**, the drum **5** is rotated via the drive unit to wash the laundry.

Because a water stream is generated inside the tub **4** while the drum **5** is rotated, there is the possibility that bubbles, which are generated as the detergent is dissolved, or contaminants discharged from the laundry during washing may remain on the door **45** after the washing is completed.

When bubbles or contaminants remain on the inner surface of the door **45** despite the completion of washing, the user may erroneously determine that the washing of laundry is not completed or may suspect the failure of the laundry treatment apparatus **100**.

The laundry treatment apparatus **100** may further include at least one of a washing unit **91** and an ejection unit **93** for removing impurities (bubbles, contaminants or the like) remaining on the door **45**.

As illustrated in FIGS. **4**A and **4**B, the washing unit **91** serves to wash the door **45** using the centrifugal force generated while the drum **5** is rotated.

In the drum **5**, because the rotating shaft M**3**, which forms the center of rotation, forms a right angle with respect to the bottom surface of the tub body **41**, the water inside the tub **4** is moved upward along the circumferential surface of the tub body **41** by centrifugal force while the drum **5** is rotated, and thereafter is moved to the introduction aperture **431** along the tub cover **43**. The washing unit **91** may serve to discharge the water, moved to the tub cover **43** by centrifugal force, in the direction in which the door **45** is located, thereby washing the door **45**.

The washing unit **91** may include a guide **915** extending from the edge of the tub cover **43** toward the introduction aperture **431**, a barrier **911** protruding from the tub cover **43** toward the upper surface of the drum **5**, and a discharge unit **913** formed through the barrier **911** for the discharge of water, supplied through the guide **915**, in the direction in which the door **45** is located.

The barrier **911** may be provided to surround the entire introduction aperture **431**, as illustrated in FIG. **4**B. In some examples, a plurality of barriers may be spaced apart from one another along the edge of the introduction aperture.

As illustrated in FIG. **4**B the barrier **911** may protrude from the edge of the introduction aperture **431** toward the drum **5**.

When the door **45** is rotatably coupled to the upper surface of the tub cover **43** so that the inner surface of the door **45** (i.e. the surface of the door **45** that is in contact with water) is located higher than the discharge unit **913**, the discharge unit **913** may be inclined at a prescribed angle to allow water to be discharged toward the door **45**.

In addition, when the door **45** includes the window **455** formed of a transparent material, the discharge unit **913** may be inclined to allow water to be discharged to the window **455**.

The guide **915** may include a first guide **915***a* and a second guide **915***b*. The first guide **915***a* guides water, moved to the edge of the tub cover **43**, to the discharge unit **913** when the drum **5** is rotated in the clockwise direction. The second guide **915***b* guides water, moved to the edge of the tub cover **43**, to the discharge unit **913** when the drum **5** is rotated in the counterclockwise direction.

In the case where the discharge unit **913** is a single hole formed in the barrier **911**, the respective guides **915***a* and **915***b* may guide water to the same discharge unit **913**. However, in the case where the discharge unit **913** includes a first discharge unit **913***a* and a second discharge unit **913***b* formed in the barrier **911**, the first guide **915***a* may guide water to the first discharge unit **913***a*, and the second guide **915***b* may guide water to the second discharge unit **913***b*.

The washing unit **91** may wash the door **45** regardless of the direction in which the drum **5** is rotated so long as the number of revolutions per minute of the drum **5** is a preset reference number of revolutions per minute (i.e. the number of revolutions per minute by which the water inside the tub body **41** is moved upward to the tub cover **43**).

In addition, the respective discharge units **913***a* and **913***b* may be inclined at a prescribed angle so that the path of water discharged from the first discharge unit **913***a* and the path of water discharged from the second discharge unit **913***b* cross each other. This serve to increase the washing range of the washing unit **91**.

The washing unit **91** may be provided in a plural number along the edge of the introduction aperture **431**, and the washing units **91** may be arranged to surround the introduction aperture **431**. In addition, at least two of the washing units **91** may be arranged s to face each other. This may serve to increase the washing capability of the washing unit **91**.

The impurities remaining on the door **45** may be removed by a washing guide **456** illustrated in FIGS. **5**A and **5**B. The washing guide **456** may be provided at the edge of the window **455**. During the rotation of the drum, water in the tub may move from the bottom surface of the tub to the edge of the frame **451** due to centrifugal force generated while the drum is rotated. The water may move around the edge of the frame **451**. In the case in which the washing guide **456** is provided at the edge of the window, the water moving around the edge of the frame **451** may be guided toward the middle of the window **455** (W**1** and W**2**). Consequently, it is possible to prevent the impurities from remaining on the window by the provision of the washing guide **456**.

In order to maximize the washing area, the washing guide **456** may include a first washing guide **456***a* and a second washing guide **456***b* disposed so as to be symmetric with respect to a line of symmetry Q of the door **45**, as illustrated in FIG. **5**B.

In some examples, one of the washing unit **91** and the washing guide **456** may be provided, and in some other examples both the washing unit **91** and the washing guide **456** may be provided.

The ejection unit **93** illustrated in FIG. **6** may be configured to eject water supplied to the tub **4** to at least one of the door **45** and the drum **5** to wash the door **45**. The ejection unit **93** may include a chamber **931** for guiding water, supplied to the supply aperture **433** provided in the tub cover **43**, toward the introduction aperture **431**, and a chamber discharge unit **933** for discharging the water introduced into the chamber **931** to the door **45**.

The chamber **931** includes an inlet chamber **931***a* located under the supply aperture **433**, and a connection chamber **931***b* for guiding the water introduced into the inlet chamber **931***a* to the chamber discharge unit **933**.

As illustrated in FIGS. **7**A and **7**B, the inlet chamber **931***a* may have a communication hole **931***e* connected to the supply aperture **433**. In order to increase the pressure of water to be discharged through the chamber discharge unit **933**, the cross-sectional area A**1** of the connection chamber **931***b* may be smaller than the cross-sectional area of the inlet chamber **931***a*. In addition, the cross-sectional area A**2** of the chamber discharge unit **933** may be smaller than the cross-sectional area A**1** of the connection chamber **931***b*.

The connection chamber **931***b* may be tilted at a prescribed angle so that water ejected from the chamber discharge unit **933** is supplied to the door **45**, which is located above the introduction aperture **431**.

In some examples where the door **45** includes the window **455**, the tilt angle of the connection chamber **931***b* may be set to an angle at which water ejected from the chamber discharge unit **933** may be supplied to the window **455**.

The inlet chamber **931***a* may further include an inlet chamber discharge unit **935** for ejecting some of the water inside the inlet chamber **931***a* into the drum **5**.

The inlet chamber discharge unit **935** may be provided to eject water toward the bottom surface **57** of the drum body, or may be provided to eject water toward the circumferential surface **55** of the drum body.

When the inlet chamber discharge unit **935** is provided to eject water toward the bottom surface **57** of the drum body, the inlet chamber discharge unit **935** may serve to remove bubbles generated inside the drum **5** by ejecting water into the drum **5** during washing.

When the controller controls the water supply valve **77** during washing to supply water to the chamber **931**, bubbles generated inside the tub **4** during washing are removed, which may prevent impurities, including the bubbles, from remaining on the door **45**.

In other examples, when the inlet chamber discharge unit **935** is provided to eject water toward the circumferential surface **55** of the drum body, the inlet chamber discharge unit **935** may serve to wash the circumferential surface **55** of the drum **5**.

When the controller controls the water supply valve **77** to supply water to the chamber **931** after washing is completed and also rotates the drum **5**, impurities remaining on the surface of the drum **5** may be washed by the water discharged from the inlet chamber discharge unit **935**.

In addition, the connection chamber **931***b* may further have a connection chamber discharge unit **937** for discharging water to the drum **5**.

At least two connection chamber discharge units **937** may be provided. In some examples, one connection chamber discharge unit **937** may be provided to discharge water toward the bottom surface **57** of the drum body, and the other connection chamber discharge unit **937** may be provided to discharge water toward the circumferential surface **55** of the drum body.

The inlet chamber discharge unit **935** and the connection chamber discharge unit **937** may be disposed at the edge of the drum **5** toward the center of rotation of the drum **5**. When the drum **5** is rotated, therefore, it is possible to eject water over the entire area of the drum, thereby effectively removing bubbles from the drum.

In some examples, the door **45** may open the introduction aperture **431** due to the discharge of water from the chamber discharge unit **933** when the pressure of the water supplied through the water supply unit **7** is high (i.e. the pressure in the chamber **93** is high).

The chamber **93** may further include a pressure reduction unit **931***c* for discharging water from the chamber **93** to the drum **5** when the pressure in the chamber is equal to or greater than a predetermined reference pressure.

The pressure reduction unit **931***c* may be provided in at least one of the inlet chamber **931***a* and the connection chamber **931***b*. FIGS. **7**A and **7**B illustrates an example in which the pressure reduction unit **931***c* is provided in the connection chamber **931***b*.

The pressure reduction unit **931***c* may include a chamber through-hole **931***d* formed through the connection chamber **931***b* and an elastic body **931***f* provided in the chamber through-hole **931***d* for opening the chamber through-hole **931***d* when the pressure in the connection chamber **931***b* is equal to or greater than a reference pressure. The laundry treatment apparatus may prevent impurities, generated inside a tub during washing from remaining on a door.

The laundry treatment apparatus may wash the door using the centrifugal force generated by water stored in a tub while a drum is rotated. The laundry treatment apparatus may include an ejection unit for washing a door using a device for supplying water to a tub. The laundry treatment apparatus may include an additional flow channel for removing bubbles or impurities from a door, and may selectively drain water from a device for removing bubbles or impurities when the pressure in the device for removing bubbles or impurities is excessively increased, thereby preventing water leakage or the backward flow of wash water.

What is claimed is:

1. A laundry treatment apparatus comprising:

a tub body configured to store water therein;

a drum that is rotatably provided in an inside of the tub body and that has a first opening configured to receive laundry at a top portion of the drum; and

a tub cover configured to cover the tub body and having a second opening that provides access to an inside of the drum, the tub cover comprising:

a tub cover door configured to open and close the second opening; and

a supply aperture configured to supply water into the inside of the drum; and

at least one guide configured to, in a state in which the tub cover door is closed and the drum rotates inside the tub body, guide at least a portion of water that is rotated inside the tub body in a direction away from a periphery of the tub body and toward a central region of the tub cover door.

2. The laundry treatment apparatus according to claim **1**, wherein the at least one guide comprises:

at least one first guide provided on the tub cover along a periphery of the tub cover; and

at least one second guide provided on the tub cover door along a periphery of the tub cover door.

3. The laundry treatment apparatus according to claim **2**, wherein the at least one first guide further comprises a discharge unit configured to discharge water supplied through the at least one first guide in a direction towards the central region of the tub cover door.

4. The laundry treatment apparatus according to claim **3**, further comprising a rotating shaft that extends from a bottom surface of the tub body toward the second opening formed through the tub cover, and that is configured to rotate a drum body of the drum.

5. The laundry treatment apparatus according to claim **4**, wherein the at least one first guide is configured to, in a state in which the drum body is rotated by the rotating shaft inside the tub body, guide at least some of water that is rotated inside the tub body away from a periphery of the tub cover and toward a central region of the second opening formed in the tub cover.

6. The laundry treatment apparatus according to claim **5**, wherein the at least one first guide comprises:

a first direction guide portion configured to guide water moved to the tub cover to the discharge unit when the drum body is rotated in a clockwise direction; and

a second direction guide portion configured to guide water moved to the tub cover to the discharge unit when the drum body is rotated in a counterclockwise direction.

7. The laundry treatment apparatus according to claim **6**, wherein

the at least one first guide further comprises a barrier protruding from the tub cover toward an upper surface of the drum, and

the discharge unit comprises:

a first discharge unit formed through the barrier and configured to discharge water supplied through the first direction guide portion; and

a second discharge unit formed through the barrier and configured to discharge water supplied through the second direction guide portion.

8. The laundry treatment apparatus according to claim **7**, wherein the first discharge unit and the second discharge unit are inclined and configured to discharge water such that a path of the water discharged from the first discharge unit and a path of the water discharged from the second discharge unit cross each other.

9. The laundry treatment apparatus according to claim **4**, wherein the tub cover door comprises:

a frame that is rotatably coupled to the tub cover and that defines the second opening; and

a window provided in the frame through which the inside of the tub body is visible from an outside of the tub body,

wherein the at least one second guide is provided on the frame of the tub cover door and is configured to, in a state in which the drum body is rotated by the rotating shaft inside the tub body, guide at least some of water that is rotated inside the tub body in a direction away from a periphery of the window and toward a central region of the window.

10. The laundry treatment apparatus according to claim **2**, wherein the at least one first guide is configured to guide, along an inside surface of the tub cover and towards the second opening formed in the tub cover, water that moves along a periphery of the tub cover.

11. The laundry treatment apparatus according to claim **2**, wherein the at least one second guide is configured to guide, along an inside surface of the tub cover door and towards a central region of the tub cover door, water that moves along a periphery of the tub cover door.

12. The laundry treatment apparatus according to claim **11**, wherein the at least one second guide is configured to disperse, over the inside surface of the tub cover door, the water that moves along the periphery of the tub cover door.

13. The laundry treatment apparatus according to claim **12**, wherein the tub cover door further comprises a window through which the inside of the tub body is visible from an outside of the tub body, and

the at least one second guide is provided on the tub cover door and is configured to guide the water away from the periphery of the tub cover door towards an inside surface of the window.

14. The laundry treatment apparatus according to claim **13**, wherein the at least one second guide comprises a first lateral guide portion and a second lateral guide portion that are provided on opposing sides of the second opening of the tub cover.

15. The laundry treatment apparatus according to claim **2**, wherein, in a state in which the tub cover door closes the second opening of the tub cover, the at least one second guide is located inside the second opening.

16. The laundry treatment apparatus according to claim **2**, wherein:

the tub cover door further comprises a sealing unit configured to seal the tub cover door to the tub cover in a state in which the tub cover door closes the second opening of the tub cover, and

the at least one second guide is provided on an inner region of a closed curve formed by the sealing unit.

17. The laundry treatment apparatus according to claim **16**, wherein the at least one second guide is configured to protrude from the sealing unit towards a central region of the closed curve formed by the sealing unit.

18. The laundry treatment apparatus according to claim **17**, wherein the at least one second guide comprises:

a first lateral guide configured to protrude from the sealing unit toward the central region of the closed curve formed by the sealing unit; and

a second lateral guide configured to protrude from the sealing unit toward the central region of the closed curve formed by the sealing unit,

wherein the first lateral guide and the second lateral guide are provided on opposing sides of the second opening of the tub cover.

19. The laundry treatment apparatus according to claim **2**, wherein the at least one first guide comprises at least two first guides that are arranged to face each other on opposing sides of the second opening of the tub cover.

20. The laundry treatment apparatus according to claim **7**, wherein:

the tub cover door further comprises a window through which the inside of the tub body is visible from an outside of the tub body, and

the first discharge unit and the second discharge unit are inclined and configured to discharge water from the at least one first guide towards the window of the tub cover door.

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