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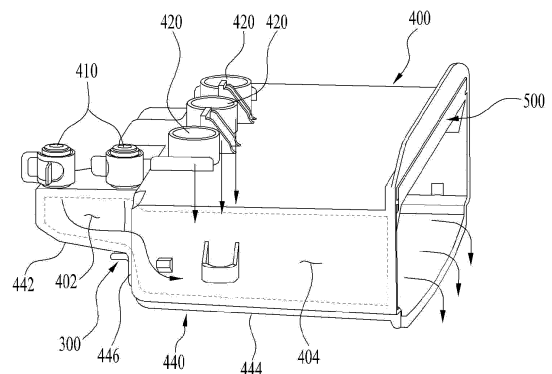
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(54) **LAUNDRY TREATING APPARATUS**

(57) Disclosed is a laundry treating apparatus. The laundry treating apparatus according to an embodiment of the present invention comprises: a cabinet; a tub which is provided in the cabinet and accommodates water; a drum provided in the tub to be rotatable and accommodating laundry; a detergent storage unit which is provided in the cabinet and stores detergent; a detergent discharge unit which is connected to the detergent storage unit to be supplied with the detergent, and discharges the detergent along with the water into the tub; and a detergent sensing unit which is provided in the detergent discharge unit and senses the detergent provided in the detergent discharge unit.

[FIG. 3]



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## Description

[Technical Field]

**[0001]** The present disclosure relates to a laundry treating apparatus, and more particularly, to a laundry treating apparatus that performs a washing course of laundry as detergent is injected.

[Background]

**[0002]** A laundry treating apparatus is an apparatus that may put clothes, bedding, and the like (hereinafter, referred to as laundry) into a drum to perform a washing course that removes contaminants from the laundry. In addition to the washing course, the laundry treating apparatus may perform a rinse course, a dehydration course, a drying course, and the like.

**[0003]** The laundry treating apparatus may include a cabinet forming an outer appearance thereof, a tub disposed inside the cabinet, and the drum rotatably disposed inside the tub and accommodating the laundry therein.

**[0004]** The laundry treating apparatuses may be categorized into a top loading type and a front loading type based on a scheme of putting the laundry into the drum. The top loading type may put the laundry via a top surface of the cabinet, and the front loading type may put the laundry via a front surface of the cabinet.

**[0005]** The laundry treating apparatus may include a detergent supply device that injects detergent into the tub or into the drum to perform the washing course and the like. When the drum rotates in a state in which washing water and the detergent are supplied into the tub, the contaminants may be removed from the laundry via friction between the drum and the washing water.

**[0006]** The detergent supply device may have a detergent supply function to improve a washing effect. In this regard, the detergent may include all substances that enhance the washing effect, such as a washing agent that induces decomposition and removal of the contaminants, a softener that improves flexibility of fabrics of the laundry, and a bleach that reduces color contamination in the laundry. The detergent may include both powder and liquid forms.

**[0007]** In one example, the detergent may be supplied into the tub or the drum by flowing along a flow path that may be determined by design. However, after the detergent flows along the flow path to perform a washing course or the like of the laundry, the remaining detergent on the flow path may adhere or stick, making cleaning difficult, thereby deteriorating hygiene and manageability.

**[0008]** Furthermore, a detergent detector that detects the detergent may be disposed to identify a remaining amount of the detergent or whether the detergent is supplied normally. In a case of the detergent detector that detects presence of the detergent via contact with the

detergent, when the detergent remains in an area thereof in contact with the detergent, a normal detection function may not be exerted because of the sticking or the like of the detergent.

**[0009]** In one example, when different types of detergents are provided via a plurality of detergent storages, equipping the separate detergent detectors for the respective different types of detergents may result in inefficiency resulted from the increase in the detergent detectors.

**[0010]** In addition, when the different types of detergents are used, a gel-type adhesive may be generated because of a reaction therebetween, and such adhesive may easily adhere to the detergent detector or the like, making the cleaning of the detergents and maintainability of the detergent detector more important.

[Summary]

[Technical Problem]

**[0011]** Embodiments of the present disclosure are to provide a laundry treating apparatus that may effectively clean and manage a detergent detector that detects detergent.

**[0012]** Additionally, embodiments of the present disclosure are to provide a laundry treating apparatus that may efficiently use a detergent detector by effectively removing residual detergent from the detergent detector.

**[0013]** Additionally, embodiments of the present disclosure are to provide a laundry treating apparatus that effectively suppresses sticking of detergent remaining in a detergent detector.

**[0014]** Additionally, embodiments of the present disclosure are to provide a laundry treating apparatus that includes a detergent detector that may detect a plurality of detergents together.

[Technical Solutions]

**[0015]** A laundry treating apparatus according to an embodiment of the present disclosure may detect detergent via a detergent detector. Additionally, the detergent detector including electrodes may be located at a most downstream side of a flow path of the detergent, and thus, may be cleaned with water.

**[0016]** In an embodiment of the present disclosure, the detergent detector may easily remove residues from surfaces of the electrodes, thereby preventing sticking or the like of the detergent and improving detection reliability. In addition, a location where a plurality of different types of detergents may be detected with one detergent detector may be selected, which is efficient.

**[0017]** In an embodiment of the present disclosure, a detergent outlet that supplies the detergent into a tub or a drum may have a detergent supplier at a rear side thereof, and the detergent detector may be located forwardly of the detergent supplier.

**[0018]** The detergent may be introduced into an upper portion of the detergent outlet and fall toward a bottom, and a discharge direction or the like of the detergent may be changed as needed. In the detergent outlet, a blocking wall may be disposed between a bottom of the detergent detector and a discharger to prevent the detergent from splashing onto a ceiling or the like of the detergent outlet and not being washed during a detergent discharge process.

**[0019]** Inside the detergent outlet, the detergent may be discharged toward the bottom, the electrodes of the detergent detector may be located on a wall surface, and the detergent may flow along the bottom toward the wall surface and come into contact with the detergent detector.

**[0020]** Such laundry treating apparatus according to an embodiment of the present disclosure includes a cabinet, a tub, a drum, a detergent storage, a detergent outlet, and a detergent detector. The tub is disposed inside the cabinet and accommodates water therein.

**[0021]** The drum is rotatably disposed inside the tub and accommodates laundry therein. The detergent storage is disposed in the cabinet and stores detergent therein. The detergent outlet is connected to the detergent storage to receive the detergent and discharges the detergent along with water into the tub.

**[0022]** The detergent detector is disposed in the detergent outlet, and detects the detergent present in the detergent outlet.

**[0023]** The detergent outlet may include a detergent inlet hole allowing the detergent to be introduced therethrough and a detergent discharge hole allowing the detergent and water to be discharged into the tub, and the detergent detector may be disposed on a flow path where the detergent introduced into the detergent inlet hole flows toward the detergent discharge hole.

**[0024]** The detergent storage may include a plurality of storage spaces divided from each other to store respective detergents therein,

**[0025]** the detergent detector may be disposed in the detergent outlet on a flow path where the respective detergents introduced from the plurality of storage spaces gather and flow.

**[0026]** The detergent outlet may include a first bottom, a second bottom located downwardly of the first bottom, and a step wall connecting the first bottom with the second bottom in a stepwise manner, the detergent introduced into the detergent inlet hole may flow to sequentially pass the first bottom, the step wall, and the second bottom and reach the detergent discharge hole, and the detergent detector may be disposed on the step wall.

**[0027]** The detergent outlet may further include a detergent guide wall having at least a portion positioned facing the step wall, wherein the detergent guide wall allows the detergent delivered from the first bottom to flow between the step wall and the detergent guide wall.

**[0028]** The detergent outlet may allow at least a portion of introduced water to flow toward the detergent detector.

**[0029]** The detergent outlet may include a detergent inlet hole allowing the detergent to be introduced therethrough, a water inlet hole allowing water to be introduced therethrough, and a water guide allowing at least a portion of water introduced via the water inlet hole to flow toward the detergent inlet hole.

**[0030]** The water guide may include a water guide rib having one end facing the water inlet hole and the other end facing the detergent inlet hole.

**[0031]** The detergent outlet may further include a water diffuser disposed between a bottom thereof and the water inlet hole to diffuse water introduced via the water inlet hole and discharge water to the bottom. The water diffuser may include a water guide.

**[0032]** The water inlet hole may be located in a ceiling of the detergent outlet and discharge water into the detergent outlet, and the water diffuser may be disposed to cross an area between the bottom and the ceiling of the detergent outlet, wherein the water diffuser may include a plurality of water delivery holes allowing water introduced via the water inlet hole to be discharged to the bottom.

**[0033]** The detergent outlet may include a first space where the detergent inlet hole is located and a second space where the water inlet hole and a detergent discharge hole are located, and the water diffuser may cross the first space and the second space together, and the water guide may be located in the first space.

**[0034]** The detergent outlet may be formed as the first space protrudes rearward from the second space. The detergent detector may include a pair of electrodes in contact with the detergent inside the detergent outlet.

**[0035]** The detergent detector may detect the detergent mixed in water when water and the detergent are mixed with each other.

**[0036]** The detergent detector may include an electrode sensor, and the laundry treating apparatus may further include a controller that is connected in a signal manner to the electrode sensor and determines whether the detergent is mixed in water based on a measured value of the electrode sensor.

**[0037]** The cabinet may be equipped with a laundry inlet defined in a top surface thereof, wherein the laundry is put into the laundry inlet, the tub and the drum may have open top surfaces to accommodate water and the laundry therein, respectively, and the detergent outlet may be located upwardly of the tub and discharge water and the detergent into the tub and the drum.

**[0038]** In one example, a laundry treating apparatus according to an embodiment of the present disclosure includes a cabinet, a tub disposed inside the cabinet and accommodating water therein, a drum rotatably disposed inside the tub and accommodating laundry therein, a detergent outlet disposed inside the cabinet, wherein the detergent outlet mixes water supplied from outside with detergent to form a mixture and discharges the mixture into the tub, and a detergent detector that is disposed in the detergent outlet and detects the detergent mixed with

water inside the detergent outlet.

[Advantageous Effects]

**[0039]** The embodiments of the present disclosure may provide the laundry treating apparatus that may effectively clean and manage the detergent detector that detects the detergent.

**[0040]** Additionally, the embodiments of the present disclosure may provide the laundry treating apparatus that may efficiently use the detergent detector by effectively removing the residual detergent from the detergent detector.

**[0041]** Additionally, the embodiments of the present disclosure may provide the laundry treating apparatus that effectively suppresses the sticking of the detergent remaining in the detergent detector.

**[0042]** Additionally, the embodiments of the present disclosure may provide the laundry treating apparatus that includes the detergent detector that may detect the plurality of detergents together.

[Brief Description of the Drawings]

**[0043]**

FIG. 1 is a perspective view showing an outer appearance of a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 2 is a cross-sectional view showing interior of a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 3 shows a detergent outlet of a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 4 is a rear view of a detergent outlet in a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 5 is a diagram showing a first space inside a detergent outlet in a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 6 is a diagram showing a detergent detector disposed in a detergent outlet in a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 7 is a diagram showing a step wall of a detergent outlet in a laundry treating apparatus according to an embodiment of the present disclosure.

FIG. 8 is a diagram showing a water diffuser disposed in a detergent outlet in a laundry treating apparatus according to an embodiment of the present disclosure.

[Best Mode]

**[0044]** Hereinafter, with reference to the attached drawings, embodiments of the present disclosure will be described in detail such that those skilled in the art may

easily practice them.

**[0045]** However, the present disclosure may be implemented in several different forms and may not be limited to the embodiments described herein. Further, to clearly illustrate the present disclosure in the drawings, parts unrelated to the description are omitted, and similar drawing numerals are assigned to similar parts throughout the present document.

**[0046]** In the present document, redundant descriptions of the same components are omitted.

**[0047]** Further, in the present document, when a component is referred to as being 'connected' to another component, it should be understood that the components may be directly connected to each other, but there may be another component therebetween. On the other hand, in the present document, when a component is referred to as being 'directly connected' to another component, it should be understood that there is no other component therebetween.

**[0048]** Additionally, the terms used herein are merely used to describe specific embodiments and are not intended to limit the present disclosure.

**[0049]** Further, as used herein, singular expressions may include plural expressions, unless the context clearly dictates otherwise.

**[0050]** In addition, in the present document, it should be understood that terms such as 'include' or 'have' are only intended to indicate the presence of features, numbers, steps, operations, components, parts, or combinations thereof described herein, and do not preclude the presence or addition of other features, numbers, steps, operations, components, parts, or combinations thereof.

**[0051]** Further, in the present document, the term 'and/or' includes a combination of a plurality of listed items or any of the plurality of listed items. As used herein, 'A or B' may include 'A', 'B', or 'both A and B'.

**[0052]** FIG. 1 shows an outer appearance of a laundry treating apparatus 1 according to an embodiment of the present disclosure. Referring to FIG. 1, an embodiment of the present disclosure includes a cabinet 10.

**[0053]** The cabinet 10 forms an outer appearance of the laundry treating apparatus 1. The cabinet 10 may be formed in various shapes, such as a square pillar shape, as well as another polygonal pillar shape or a circular pillar shape.

**[0054]** The cabinet 10 may be formed by coupling a plurality of panels to each other. For example, the cabinet 10 may include a front panel 11, a pair of side panels, a rear panel, a top panel 13, and a bottom panel, and the plurality of panels may establish a coupling relationship with each other or be molded integrally.

**[0055]** In an embodiment of the present disclosure, the cabinet 10 may include a laundry inlet 14 and may include a control panel 80.

**[0056]** The laundry inlet 14 is formed for a user to put laundry for treatment, such as washing, into the cabinet 10. FIG. 1 shows the laundry treating apparatus 1 of a top loading type in which the laundry inlet 14 is defined

in the top surface panel 13, but an embodiment of the present disclosure is not necessarily limited to the top loading type, and the laundry treating apparatus 1 is able to be of a front loading type in which the laundry inlet 14 is defined in the front panel 11.

**[0057]** However, for convenience of description, unless otherwise specified, a description will be made below based on the embodiment of the top loading type in which the laundry inlet 14 is defined in the top panel 13 as shown in FIG. 1.

**[0058]** In one example, the cabinet 10 may have a laundry door 15. The laundry door 15 may be disposed on the cabinet 10 to open and close the laundry inlet 14. For example, the laundry door 15 may open and close the laundry inlet 14 by moving away from or approaching the top panel 13 in which the laundry inlet 14 is defined in a sliding or pivoting manner. When the laundry inlet 14 is defined in the front panel 11, it is natural that the laundry door 15 is also disposed on the front panel 11.

**[0059]** In one example, the control panel 80 serves as a means to inform the user of an operating state of the laundry treating apparatus 1 or to allow the user to input a manipulation signal. The control panel 80 may include an output unit that may provide visual information, auditory information, or the like to the user, and an input unit that is manipulated by the user to generate the manipulation signal.

**[0060]** In FIG. 1, the control panel 80 is shown installed on the top panel 13, but the present disclosure is not necessarily limited thereto. The control panel 80 may be disposed at various locations, such as on the front panel 11, as needed, and may include a plurality of control panels.

**[0061]** FIG. 2 shows a cross-section showing the interior of the laundry treating apparatus 1 according to an embodiment of the present disclosure. The cross-section in FIG. 2 corresponds to the interior of the laundry treating apparatus 1 as seen from the side.

**[0062]** Referring to FIG. 2, an embodiment of the present disclosure may include a tub 20, and the tub 20 may be disposed inside the cabinet 10 and accommodate water therein. A space may be defined inside the tub 20, and water for the washing or the like of the laundry may be accommodated inside the tub 20.

**[0063]** The tub 20 may be formed in various shapes and may include a tub inlet 22 facing the laundry inlet 14. FIG. 2 shows the tub 20 having a top surface that is opened to define the tub inlet 22.

**[0064]** The tub 20 may include various components. For example, a pulsator may be disposed on a bottom surface of the tub 20 to form a water flow, and a vibration sensor to measure vibration, a water level sensor to measure a water level, a load sensor to measure a load, and the like may be disposed.

**[0065]** A drum 30 may be installed inside the tub 20. The drum 30 may be rotatably installed inside the tub 20. The drum 30 may be connected to a driving shaft of a driver 40 and may be rotated by receiving a rotational

force.

**[0066]** The driver 40 may be disposed outside the tub 20. The driver 40 may include the driving shaft that extends through the tub 20, and the driving shaft may be connected to the drum 30 to rotate the drum 30.

**[0067]** The driver 40 may be located under the tub 20, and the driving shaft may protrude upward from the bottom surface of the tub 20 and be connected to a bottom surface of the drum 30. A top surface of the drum 30 may be opened to define a drum inlet 32.

**[0068]** The drum 30 may be formed in various shapes. The drum 30 may have a circular cross-section centered on a rotation axis for ease of rotation. A space may be defined inside the drum 30, and the laundry input via the laundry inlet 14 may be accommodated inside the drum 30.

**[0069]** In addition, the drum 30 may have a plurality of through-holes defined in an outer circumferential surface thereof, thereby sharing water accommodated within the tub 20. In other words, water provided into the tub 20 may flow into the drum 30 via the outer circumferential surface of the drum 30 and be provided to the laundry.

**[0070]** The laundry input via the laundry inlet 14 of the cabinet 10 may be put into the drum 30 via the tub inlet 22 and the drum inlet 32. The laundry inlet 14, the tub inlet 22, and the drum inlet 32 may be aligned to face each other.

**[0071]** However, when the laundry inlet 14 is defined in the front panel 11, it is natural that the tub inlet 22 and the drum inlet 32 may face forward, the driving shaft may extend in a front and rear direction, and the driver 40 may be located under or at the rear of the tub 20.

**[0072]** In one example, an embodiment of the present disclosure may include an external water source 60 that is connected to a water source located outside, such as an urban water pipe, and receives water from the outside of the cabinet 10. The external water source 60 may include a water supply valve 150 to regulate a flow of water.

**[0073]** The water supply valve 150 may be embedded in the external water source 60 or may be disposed on a water supply pipe 100, which will be described later, outside the external water source 60. The water supply valve 150 may include a varying number of water supply valves as needed. The water supply valve 150 may be connected to the water supply pipe 100 and may regulate the flow of water provided to the water supply pipe 100.

**[0074]** In other words, opening the water supply valve 150 may allow the flow of water, and closing the water supply valve 150 may block the flow of water. The water supply valve 150 may be connected in an electrical/signal manner to a controller 50, which will be described later, and may be controlled in the opening and closing by the controller 50.

**[0075]** The water supply pipe 100 may be disposed in the cabinet 10, and water provided from the external water source 60 may flow therethrough. The water supply pipe 100 may become means of connecting the external water supply source 60 with the tub 20 or with a detergent

outlet 400, which will be described later.

**[0076]** The water supply pipe 100 may include a varying number of water supply pipes as needed. At least one of the plurality of water supply pipes 100 may correspond to a direct water pipe 120 that is directly connected to the tub 20. When the water supply pipe 100 includes one or more water supply pipes, the water supply valve 150 may also include one or more water supply valves, but the number of water supply pipes 100 and the number of water supply valves 150 are not necessarily coincident with each other.

**[0077]** In one example, an embodiment of the present disclosure may further include a drainage 90, and the drainage 90 may be connected to the tub 20 to discharge water accommodated in the tub 20 to the outside of the cabinet 10. The drainage 90 may include a drain pump for forming the flow of water, and may include a drain valve for regulating the flow of water.

**[0078]** In one example, an embodiment of the present disclosure may include a detergent storage 70. The detergent storage 70 may be disposed in the cabinet 10 and may store detergent therein.

**[0079]** The detergent storage 70 may be installed on an outer side of the cabinet 10, or may be installed inside of the cabinet 10. The detergent storage 70 may be separated from the cabinet 10, or may be formed integrally so as not to be separated from the cabinet 10.

**[0080]** FIG. 2 schematically shows the detergent storage 70 disposed to be exposed to the outside at a top of the cabinet 10 according to an embodiment of the present disclosure, but the shape and the location of the detergent storage 70 are not necessarily limited thereto.

**[0081]** The detergent storage 70 may have a space defined therein, so that the detergent may be stored. In addition, the detergent storage 70 may include a plurality of detergent storages, so that different detergents may be stored. The detergent storage 70 may include a varying number of detergent storages as needed.

**[0082]** An embodiment of the present disclosure may include a detergent valve 250. The detergent valve 250 may be connected to the detergent storage 70 and may regulate a flow of the detergent discharged from the detergent storage 70.

**[0083]** When the detergent storage 70 includes one or more detergent storages, the detergent valve 250 may also include one or more detergent valves. The plurality of detergent valves 250 may regulate the flows of detergents with respect to the plurality of detergent storages 70, respectively.

**[0084]** The detergent storage 70 may be connected to a detergent pipe 200. The detergent pipe 200 may be disposed in the cabinet 10, and the detergent discharged from the detergent storage 70 where the detergent is stored may flow therethrough. The detergent pipe 200 may be disposed in the cabinet 10. The detergent pipe 200 may be located inside the cabinet 10, or at least a portion thereof may be exposed to the outside of the cabinet 10.

**[0085]** The detergent storage 70 may be directly connected to the detergent pipe 200 or indirectly connected to the detergent pipe 200 via the detergent valve 250. When the detergent storage 70 and the detergent pipe 200 are directly connected to each other, the detergent valve 250 may be installed on the detergent pipe 200.

**[0086]** The detergent discharged from the detergent storage 70 may flow along the detergent pipe 200. That is, the detergent pipe 200 may form at least a portion of the flow path of the detergent. The detergent discharged from the detergent storage 70 may flow along the detergent pipe 200 and the like and be provided into the tub 20 or the drum 30.

**[0087]** In one example, an embodiment of the present disclosure may include the detergent outlet 400. The detergent outlet 400 may be disposed in the cabinet 10, may be connected to the water supply pipe 100 to receive water and the detergent, and may discharge water and the detergent into the tub 20.

**[0088]** The detergent outlet 400 may be disposed inside the cabinet 10 or disposed to be exposed to the outside of the cabinet 10. The detergent outlet 400 may be connected to the water supply pipe 100 and the detergent pipe 200 as needed. A mixed solution of the detergent and water may exist inside the detergent outlet 400, and the mixed solution may be provided from the detergent outlet 400 into the tub 20 or the drum 30.

**[0089]** The detergent outlet 400 may provide water and the detergent into the tub 20 or the drum 30. The detergent outlet 400 may directly discharge water and the detergent into the tub 20 or the drum 30, or may supply water and the detergent into the tub 20 or the drum 30 via other components such as a flow pipe of the mixed solution.

**[0090]** In one example, an embodiment of the present disclosure may include the controller 50. The controller 50 may be connected in an electrical/signal manner not only to the control panel 80, but also various valves, sensors, and motors.

**[0091]** The controller 50 may transmit various signals to the user via the control panel 80 or receive the manipulation signal from the user via the control panel 80. The controller 50 may adjust operating states of the various valves based on the manipulation signal of the user or pre-stored information.

**[0092]** FIG. 3 shows the detergent outlet 400 according to an embodiment of the present disclosure, and FIG. 4 is a rear view of the detergent outlet 400 in FIG. 3.

**[0093]** Referring to FIGS. 3 and 4, an embodiment of the present disclosure may include the detergent outlet 400. The detergent outlet 400 may be connected to the detergent storage 70 to receive the detergent, and may discharge the detergent along with water into the tub 20.

**[0094]** The detergent outlet 400 may be connected to the detergent pipe 200 and the water supply pipe 100 described above, allowing water and the detergent to flow thereinto. The detergent outlet 400 may include a detergent inlet hole 410 through which the detergent flowing

along the detergent pipe 200 flows thereinto. The detergent outlet 400 may include a water inlet hole 420 through which water flowing along the water supply pipe 100 flows thereinto.

**[0095]** The detergent inlet hole 410 and the water inlet hole 420 may include a plurality of detergent inlet holes and a plurality of water inlet holes, respectively. For example, the detergent storage 70 may include a plurality of detergent storages, and include a first detergent storage 70 and a second detergent storage 70. The first detergent storage 70 may be connected to a first detergent valve 250 and a first detergent pipe 200, and the second detergent storage 70 may be connected to a second detergent valve 250 and a second detergent pipe 200.

**[0096]** Each of the first detergent pipe 200 and the second detergent pipe 200 may be connected to the detergent outlet 400. That is, the detergent inlet hole 410 of the detergent outlet 400 may include a first detergent inlet hole 410 connected to the first detergent pipe 200 and a second detergent inlet hole 410 connected to the second detergent pipe 200.

**[0097]** Different detergents may be stored in the first detergent storage 70 and the second detergent storage 70, and therefore, the different types of detergents may flow into the detergent outlet 400 via the first detergent inlet hole 410 and the second detergent inlet hole 410.

**[0098]** Additionally, the water supply valve 150 may include a plurality of water supply valves, and the water supply pipe 100 may also include a plurality of water supply pipes to be respectively connected to the plurality of water supply valves 150. Accordingly, the water inlet hole 420 of the detergent outlet 400 may also include the plurality of water inlet holes to be respectively connected to the different water supply pipes 100.

**[0099]** For example, the water supply pipe 100 may include a cold water supply pipe 100, a hot water supply pipe 100, and the like, and the water inlet hole 420 may include a first water inlet hole 420 connected to the cold water supply pipe 100, a second water inlet hole 420 connected to the hot water supply pipe 100, and the like.

**[0100]** Water and the detergent flowing into the detergent outlet 400 may be collected and flow on a bottom 440 of the detergent outlet 400 because of self-weights thereof. The detergent outlet 400 may have a detergent discharge hole through which water and the detergent are discharged in one side thereof.

**[0101]** That is, water and the detergent flowing into the detergent outlet 400 may flow along the bottom 440 of the detergent outlet 400 and be discharged to the outside of the detergent outlet 400 via the detergent discharge hole. Water and the detergent discharged from the detergent outlet 400 may flow into the tub 20 or the drum 30.

**[0102]** For example, in an embodiment of the present disclosure, the detergent outlet 400 may be located upwardly of the drum 30 and the tub 20, and a detergent discharge hole 430 of the detergent outlet 400 may be located upwardly of the drum inlet 32 and the tub inlet 22. Accordingly, water and the detergent discharged from

the detergent discharge hole 430 may fall because of the self-weights thereof and flow into the tub 20 or the drum 30.

**[0103]** However, the detergent discharge hole 430 of the detergent outlet 400 may be connected to a discharge pipe for flow of water and the detergent. In this case, the discharge pipe may be in communication with the inside of the drum 30 or the tub to provide water and the detergent into the drum 30.

**[0104]** In one example, a water diffuser 500 to diffuse water introduced via the water inlet hole 420 and deliver the same to the bottom 440 may be included inside the detergent outlet 400. A detailed description of the water diffuser 500 will be made later.

**[0105]** An embodiment of the present disclosure may include the detergent detector 300. The detergent detector 300 may be disposed in the detergent outlet 400 and may detect the detergent present inside the detergent outlet 400. The detergent detector 300 may detect the detergent as at least a portion thereof is exposed to the internal space of the detergent outlet 400 and comes into contact with the detergent or a mixed solution of water and the detergent.

**[0106]** In an embodiment of the present disclosure, the detergent detector 300 for detecting the detergent is included in the detergent outlet 400, so that the detergent detector 300 may be cleaned by water provided to the detergent outlet 400, thereby resolving management problems caused as the detergent remains in the detergent detector 300.

**[0107]** In other words, in an embodiment of the present disclosure, the detergent detector 300 is not disposed in the detergent storage 70, the detergent pipe 200, or the like, but the detergent detector 300 is disposed in the detergent outlet 400 to which water is provided, so that a cleaning effect and a management effect of the detergent detector 300 may be greatly improved, and reliability of the detected value of the detergent detector 300 may be greatly improved.

**[0108]** In one example, in an embodiment of the present disclosure, the detergent outlet 400 may include the detergent inlet hole 410 through which the detergent is introduced, and the detergent discharge hole 430 through which the detergent and water are discharged into the tub 20, as described above.

**[0109]** The detergent detector 300 may be disposed on a flow path along which the detergent flowing into the detergent inlet hole 410 flows toward the detergent discharge hole 430.

**[0110]** In the detergent outlet 400, the detergent inlet hole 410 and the detergent discharge hole 430 may be spaced apart from each other, and the detergent may have the flow path to flow from the detergent inlet hole 410 toward the detergent discharge hole 430 in the internal space of the detergent outlet 400.

**[0111]** In FIG. 3, the flow path of the detergent corresponding to a shape of the bottom 440 of the detergent outlet 400 is shown with arrows according to an embod-

iment of the present disclosure. The detergent may be introduced via the detergent inlet hole 410, flow along the bottom 440, and be discharged via the detergent discharge hole 430.

**[0112]** For example, in an embodiment of the present disclosure, the detergent inlet hole 410 may be located at a rear side of the detergent outlet 400, and the detergent discharge hole 430 may be located at a front side of the detergent outlet 400. The detergent detector 300 may be disposed on the flow path of the detergent flowing from the rear side to the front side of the detergent outlet 400.

**[0113]** FIGS. 3 and 4 show the detergent detector 300 installed on a step wall 446 connecting a first bottom 442 with a second bottom 444 of the detergent outlet 400. However, a location of the detergent detector 300 may be determined in various ways based on the flow path of the detergent.

**[0114]** In one example, in an embodiment of the present disclosure, the detergent storage 70 may include the plurality of storage spaces divided from each other and storing the detergents therein, as described above. For example, the detergent storage 70 may include the first detergent storage 70, the second detergent storage 70, and the like divided from each other.

**[0115]** The detergent detector 300 may be disposed in the detergent outlet 400 on the flow path through which the detergents introduced from the plurality of storage spaces gather and flow. Specifically, the different detergents introduced via the first detergent inlet hole 410 and the second detergent inlet hole 410 in the detergent outlet 400 may gather and flow together within the detergent outlet 400.

**[0116]** The detergent detector 300 may be disposed on the flow path through which the detergents introduced via the first detergent inlet hole 410 and the second detergent inlet hole 410 gather and flow, and may detect the plurality of detergents.

**[0117]** The controller 50 may be connected in an electrical/signal manner to the detergent detector 300 and may identify whether the detergent is supplied based on the detected value of the detergent detector 300. For example, when a detergent detection signal is not generated from the detergent detector 300 during the detergent supply process, the controller 50 may identify that the detergent in the detergent storage 70 is entirely exhausted and inform the user of the detergent exhausted situation via the control panel 80 or the like described above.

**[0118]** Furthermore, the detergent detector 300 in the present disclosure is located on the integrated flow path for the plurality of detergents introduced along the plurality of detergent inlet holes 410, which is advantageous because whether the plurality of detergents are exhausted may be identified.

**[0119]** In this regard, the plurality of detergents may refer to detergents provided from the different detergent storages 70 and may be of different types.

**[0120]** It is shown in FIG. 3 that the plurality of detergents are introduced into a first space 402 of the detergent outlet 400, the step wall 446 formed between the first bottom 442 located in the first space 402 and the second bottom 444 in a second space 404 corresponds to the flow path of the plurality of detergents, and the detergent detector 300 is disposed on the step wall 446.

**[0121]** However, the location of the detergent detector 300 may vary depending on the shape of the detergent outlet 400 or the locations of the detergent inlet hole 410, the water inlet hole 420, and the detergent discharge hole 430.

**[0122]** FIGS. 3 and 4 show the step wall 446 present between the first bottom 442 and the second bottom 444 viewed from the outside, FIG. 5 shows the step wall 446 viewed from the inside of the detergent outlet 400, and FIG. 6 shows the detergent detector 300 disposed on the step wall 446.

**[0123]** Referring to FIGS. 5 and 6, the detergent outlet 400 may include the first bottom 442, the second bottom 444 located downwardly of the first bottom 442, and the step wall 446 that connects the first bottom 442 with the second bottom 444 in a stepwise manner.

**[0124]** Specifically, in an embodiment of the present disclosure, the internal space of the detergent outlet 400 may include the first space 402 and the second space 404. The first space 402 and the second space 404 may be connected to each other to define the internal space. The detergent inlet hole 410 may be connected to the first space 402, and the detergent discharge hole 430 may be connected to the second space 404.

**[0125]** In one example, the bottom 440 of the detergent outlet 400 may include the first bottom 442 and the second bottom 444. The first bottom 442 may be located in the first space 402, so that the detergent introduced via the detergent inlet hole 410 may be delivered. The second bottom 444 may be located in the second space 404, so that the detergent may be delivered from the first bottom 442.

**[0126]** The step wall 446 may be disposed between the first bottom 442 and the second bottom 444. The first bottom 442 may have a higher location than the second bottom 444, and the step wall 446 may connect the first bottom 442 with the second bottom 444 in the stepwise manner.

**[0127]** Accordingly, the detergent introduced via the detergent inlet hole 410 and present on the first bottom 442 may flow to the second bottom 444 via the step wall 446. In other words, the step wall 446 may correspond to the integrated flow path for the plurality of detergents introduced via the detergent inlet hole 410.

**[0128]** In an embodiment of the present disclosure, the detergent introduced into the detergent inlet hole 410 may reach the detergent discharge hole 430 via the first bottom 442, the step wall 446, and the second bottom 444 in order, and the detergent detector 300 may be disposed on the step wall 446.

**[0129]** In an embodiment of the present disclosure, the

first bottom 442 may be positioned upwardly of the second bottom 444 and positioned closer to a ceiling of the detergent outlet 400. In other words, a falling distance of the detergent introduced into the detergent outlet 400 may be reduced by the vertical level of the first bottom 442.

**[0130]** Accordingly, the detergent introduced via the detergent inlet hole 410 may be suppressed from splashing and being deposited on an area other than the first bottom 442, like scattering while reaching the first bottom 442.

**[0131]** Furthermore, when the detergent inlet hole 410 is defined in the ceiling of the detergent outlet 400, the detergent introduced via the detergent inlet hole 410 falls because of the self-weight thereof. As the first bottom 442 is located upwardly of the second bottom 444, the effect of preventing the scattering of the detergent may be even more advantageous.

**[0132]** In one example, the detergent provided to the first bottom 442 may flow toward the second bottom 444 of the second space 404 where the detergent discharge hole 430 is located. To this end, the first bottom 442 may be inclined toward the second bottom 444.

**[0133]** In one example, the step wall 446 may be disposed to compensate for a vertical level difference between the first bottom 442 and the second bottom 444. In other words, the detergent from the first bottom 442 may be delivered to the second bottom 444 via the step wall 446.

**[0134]** The step wall 446 may have an approximately vertical extension direction. In other words, the detergent or water present on the step wall 446 may entirely flow downward of the step wall 446 by the self-weights thereof and be delivered to the second bottom 444, and remaining of the detergent or the like on the step wall 446 may be minimized.

**[0135]** Accordingly, in an embodiment of the present disclosure, as the detergent detector 300 is disposed on the step wall 446, presence of residue such as the detergent on the detergent detector 300 may be effectively suppressed.

**[0136]** FIG. 7 shows a detergent guide wall 520 disposed inside the detergent outlet 400 according to an embodiment of the present disclosure. Referring to FIG. 7, in an embodiment of the present disclosure, the detergent outlet 400 may include the detergent guide wall 520.

**[0137]** At least a portion of the detergent guide wall 520 may be positioned to face the step wall 446, and the detergent delivered from the first bottom 442 may flow between the step wall 446 and the detergent guide wall 520.

**[0138]** The detergent guide wall 520 may be located on the second space 404 and may be disposed approximately parallel to the step wall 446, and the detergent may flow in a separation space between the step wall 446 and the detergent guide wall 520. The detergent guide wall 520 may be formed to protrude from an inner

surface of the detergent outlet 400, or may be disposed in the water diffuser 500, which will be described later.

**[0139]** The detergent on the first bottom 442 may splash toward the second space 404 while being separated from the step wall 446 because of a vertical level difference between the highest and lowest points of the step wall 446 or a flow inertia at the first bottom 442. In an embodiment of the present disclosure, the detergent guide wall 520 facing the step wall 446 is disposed in the second space 404, thereby effectively suppressing the detergent passing the step wall 446 from splashing and being deposited on the area other than the step wall 446.

**[0140]** In one example, in an embodiment of the present disclosure, the detergent outlet 400 may allow at least a portion of introduced water to flow toward the detergent detector 300. That is, the water inlet hole 420 may be located farther from the detergent inlet hole than the detergent inlet hole 410, or a portion of water may be guided to flow to the first bottom 442 or the like inside the detergent outlet 400.

**[0141]** Accordingly, in an embodiment of the present disclosure, water is delivered to the detergent detector 300 located on the flow path of the detergent, so that the detergent detector 300 may be effectively cleaned and managed.

**[0142]** FIG. 8 shows the water diffuser 500 disposed inside the detergent outlet 400. Referring to FIG. 8, in an embodiment of the present disclosure, the detergent outlet 400 may include the aforementioned detergent inlet hole 410 and the water inlet hole 420 that is spaced apart from the detergent inlet hole 410 and through which water is introduced, and may further include a water guide 510.

**[0143]** The water guide 510 may allow at least a portion of water introduced via the water inlet hole 420 to flow toward the detergent inlet hole 410.

**[0144]** FIG. 8 shows the water guide 510 corresponding to a portion of the water diffuser 500, but the water guide 510 is not necessarily constructed as the portion of the water diffuser 500, and it is sufficient for the water guide 510 to guide water to the detergent inlet hole 410 or the detergent detector 300 inside the detergent outlet 400.

**[0145]** In an embodiment of the present disclosure, as the water guide 510 is disposed, the positional relationship between the water inlet hole 420 and the detergent inlet hole 410 may be more freely specified, and the detergent inside the detergent outlet 400 may be effectively cleaned.

**[0146]** In one example, the water guide 510 may include a water guide rib 512 with one end facing the water inlet hole 420 and the other end facing the detergent inlet hole 410.

**[0147]** Specifically, the water guide 510 may include a flow surface on which at least a portion of water introduced via the water inlet hole 420 flows, and the flow surface may extend from a side of the water inlet hole 420 to a side of the detergent inlet hole 410.

**[0148]** The water guide rib 512 may be formed on the

flow surface. The water guide rib 512 may protrude upward from the flow surface, and may extend such that one end thereof faces the water inlet hole 420 and the other end thereof faces the detergent inlet hole 410.

**[0149]** In an embodiment of the present disclosure, the water guide 510 may have a shape corresponding to the first bottom 442 and may be located upwardly of the bottom 440. That is, the water guide 510 may be disposed to cross an area between the first bottom 442 and the ceiling of the detergent outlet 400.

**[0150]** The detergent inlet hole 410 located in the first space 402 may be located in the ceiling of the detergent outlet 400 in the first space 402. In other words, the detergent introduced via the detergent inlet hole 410 may fall downward, pass the water guide 510, and be provided to the first bottom 442.

**[0151]** The water guide 510 may have a detergent passing hole 514 defined at a location corresponding to an area below the detergent inlet hole 410 such that the detergent falling from the detergent inlet hole 410 may pass. Accordingly, the detergent introduced via the detergent inlet hole 410 may be delivered directly onto the first bottom 442 rather than being delivered onto the flow surface of the water guide 510.

**[0152]** In an embodiment of the present disclosure, the water diffuser 500 described above may be disposed between the bottom 440 and the water inlet hole 420 of the detergent outlet 400 to diffuse water introduced via the water inlet hole 420 and discharge water to the bottom 440.

**[0153]** Specifically, the water diffuser 500 has a location higher than the bottom 440, that is, the first bottom 442 and the second bottom 444, of the detergent outlet 400, and may be disposed to cross an area between the bottom 440 and the water inlet hole 420.

**[0154]** The water diffuser 500 may have a shape corresponding to the second bottom 444 and may be disposed to cross an area between the second bottom 444 and the ceiling of the detergent outlet 400. The water diffuser 500 may receive water introduced via the water inlet hole 420 and deliver the same to the second bottom 444 of the detergent outlet 400 in the diffused state.

**[0155]** The water diffuser 500 may be disposed parallel to the second bottom 444 or the ceiling, and the water inlet hole 420 may be located upwardly of the ceiling of the detergent outlet 400 or the water diffuser 500.

**[0156]** Referring to FIG. 8, the water inlet hole 420 may be located at the ceiling of the detergent outlet 400 and discharge water into the detergent outlet 400, and the water diffuser 500 may be disposed to cross the area between the bottom 440 and the ceiling of the detergent outlet 400 and may include a plurality of water delivery holes 502 that discharge water introduced via the water inlet hole 420 to the bottom 440.

**[0157]** The water delivery holes 502 may have various sizes and may allow water to spread throughout the water diffuser 500 to spread and deliver water throughout the second bottom 444.

**[0158]** In one example, the water guide 510 described above may correspond to the portion of the water diffuser 500. That is, the water diffuser 500 may include the water guide 510. FIG. 8 shows the water guide 510 extending rearward from the water diffuser 500.

**[0159]** As described above, in an embodiment of the present disclosure, the detergent outlet 400 may include the first space 402 where the detergent inlet hole 410 is located and the second space 404 where the water inlet hole 420 and the detergent discharge hole 430 are located. Further, the water diffuser 500 may cross the first space 402 and the second space 404 together, and the water guide 510 may be located in the first space 402.

**[0160]** Accordingly, a portion of water introduced from the water inlet hole 420 may be diffused on the water diffuser 500 and provided to the second bottom 444 via the water delivery holes 502, and the remainder of water discharged from the water inlet hole 420 may flow along the water guide 510 and be provided to the first bottom 442, so that the first space 402 and the detergent detector 300 may be effectively cleaned.

**[0161]** The detergent outlet 400 may be formed such that the first space 402 protrudes rearward from the second space 404, and the water guide 510 may have the shape extending rearward from the water diffuser 500.

**[0162]** That is, in an embodiment of the present disclosure, the detergent outlet 400 may be formed such that the first space 402 that is connected to the detergent pipe 200 to receive the detergent is divided from the second space 404, at least a portion of the first space 402 may be located rearwardly of the second space 404, and water may be supplied to the second space 404 via the water guide 510 and the detergent may be washed.

**[0163]** In an embodiment of the present disclosure, the water diffuser 500 may include the detergent guide wall 520 described above. For example, the water diffuser 500 may be positioned upwardly of the first bottom 442, and the detergent guide wall 520 may be disposed to extend downward from a bottom surface of the water diffuser 500 and face the step wall 446.

**[0164]** A lower end of the detergent guide wall 520 is spaced apart from the second bottom 444, so that water and the detergent may freely flow between the second bottom 444 and the lower end of the detergent guide wall 520.

**[0165]** In one example, the detergent detector 300 may include a pair of electrodes 310 that are in contact with the detergent inside the detergent outlet 400. That is, in an embodiment of the present disclosure, the detergent detector 300 may include an electrode sensor including the pair of electrodes 310, and a detected value of the detergent detector 300 may correspond to a current value or a resistance value measured by the electrode sensor.

**[0166]** FIGS. 5 and 6 show the pair of electrodes 310 disposed in the detergent detector 300 exposed to the internal space of the detergent outlet 400, and water introduced via the water inlet hole 420 may wash the detergent while passing the electrodes 310.

**[0167]** Additionally, the detergent detector 300 may include a separation rib 320 that extends between the pair of electrodes 310 to prevent unnecessary short circuit from occurring. The separation rib 320 may protrude from the step wall 446 toward the detergent guide wall 520 and may extend along a height direction of the step wall 446.

**[0168]** The electrodes 310 may be located on both sides of the separation rib 320, and the separation rib 320 may suppress the electrodes 310 from being unintentionally conducting by the detergent remaining on the detergent detector 300 in the situation in which the detergent is not supplied to the detergent detector 300.

**[0169]** In an embodiment of the present disclosure, the detergent detector 300 may detect the detergent mixed in water in the state in which water and the detergent are mixed with each other. That is, the controller 50 may be connected in a signal manner to the electrode sensor, and may determine whether the detergent is mixed in water from a measured value of the electrode sensor.

**[0170]** Specifically, the detected values of the detergent detector 300, that is, the current values or the resistance values measured by the pair of electrodes 310, may all be different for when pure water is detected, when pure detergent is detected, and when water and the detergent are mixed with each other.

**[0171]** This is a result resulting from differences in a composition of objects detected by the detergent detector 300. Based on such results, the controller 50 may identify whether the detergent is supplied via whether the mixed solution of water and the detergent is detected via the detected value of the detergent detector 300.

**[0172]** Accordingly, in an embodiment of the present disclosure, even when the detergent detector 300 is not disposed on the flow path of only the detergent excluding water, the controller 50 may identify the detected value of the detergent detector 300, thereby effectively identifying the presence of the detergent even in the state in which the flow paths of water and the detergent are mixed together. Furthermore, in the situation in which water is provided to the detergent detector 300, cleaning and management of the detergent detector 300 may be performed effectively.

**[0173]** In one example, the laundry treating apparatus 1 according to an embodiment of the present disclosure may be of the top loading type as described above. For example, in an embodiment of the present disclosure, the cabinet 10 may have the laundry inlet 14 into which the laundry is put in the top surface thereof, the tub 20 and the drum 30 may have the open top surfaces to receive water and the laundry therein, respectively, and the detergent outlet 400 may be located upwardly of the tub 20 and may discharge water and the detergent into the tub 20 and the drum 30.

**[0174]** As described above, the laundry treating apparatus 1 according to an embodiment of the present disclosure may include the cabinet 10, the tub 20 that is disposed inside the cabinet 10 and accommodates water

therein, the drum 30 that is rotatably disposed inside the tub 20 and accommodates the laundry therein, the detergent outlet 400 that is disposed inside the cabinet 10, mixes water supplied from the outside with the detergent, and discharges the mixture into the tub 20, and the detergent detector 300 that detects the detergent mixed with water inside the detergent outlet 400.

**[0175]** Although the present disclosure is shown and described in relation to the specific embodiment, it will be obvious to those skilled in the art that the present disclosure may be improved and changed in various ways without departing from the technical spirit of the present disclosure provided by the following patent claims.

## Claims

1. A laundry treating apparatus comprising:

a cabinet;  
 a tub disposed inside the cabinet and accommodating water therein;  
 a drum rotatably disposed inside the tub and accommodating laundry therein;  
 a detergent storage disposed in the cabinet and storing detergent therein;  
 a detergent outlet connected to the detergent storage to receive the detergent, wherein the detergent outlet discharges the detergent along with water into the tub; and  
 a detergent detector disposed in the detergent outlet, wherein the detergent detector is configured to detect the detergent present in the detergent outlet.

2. The laundry treating apparatus of claim 1, wherein the detergent outlet includes a detergent inlet hole allowing the detergent to be introduced therethrough and a detergent discharge hole allowing the detergent and water to be discharged into the tub, wherein the detergent detector is disposed on a flow path where the detergent introduced into the detergent inlet hole flows toward the detergent discharge hole.

3. The laundry treating apparatus of claim 1, wherein the detergent storage includes a plurality of storage spaces divided from each other to store respective detergents therein,

wherein the respective detergents stored in the plurality of storage spaces are supplied to the detergent outlet,

wherein the detergent detector is disposed in the detergent outlet on a flow path where the respective detergents introduced from the plurality of storage spaces gather and flow.

4. The laundry treating apparatus of claim 2, wherein the detergent outlet includes a first bottom, a second bottom located downwardly of the first bottom, and a step wall connecting the first bottom with the second bottom in a stepwise manner,

wherein the detergent introduced into the detergent inlet hole flows to sequentially pass the first bottom, the step wall, and the second bottom and reaches the detergent discharge hole, wherein the detergent detector is disposed on the step wall.

5. The laundry treating apparatus of claim 4, wherein the detergent outlet further includes a detergent guide wall having at least a portion positioned facing the step wall, wherein the detergent guide wall allows the detergent delivered from the first bottom to flow between the step wall and the detergent guide wall.

6. The laundry treating apparatus of claim 1, wherein the detergent outlet allows at least a portion of introduced water to flow toward the detergent detector.

7. The laundry treating apparatus of claim 6, wherein the detergent outlet includes:

- a detergent inlet hole allowing the detergent to be introduced therethrough;
- a water inlet hole allowing water to be introduced therethrough; and
- a water guide allowing at least a portion of water introduced via the water inlet hole to flow toward the detergent inlet hole.

8. The laundry treating apparatus of claim 7, wherein the water guide includes a water guide rib having one end facing the water inlet hole and the other end facing the detergent inlet hole.

9. The laundry treating apparatus of claim 7, wherein the detergent outlet further includes a water diffuser disposed between a bottom thereof and the water inlet hole to diffuse water introduced via the water inlet hole and discharge water to the bottom, wherein the water diffuser includes a water guide.

10. The laundry treating apparatus of claim 9, wherein the water inlet hole is located in a ceiling of the detergent outlet and discharges water into the detergent outlet, wherein the water diffuser is disposed to cross an area between the bottom and the ceiling of the detergent outlet, wherein the water diffuser includes a plurality of water delivery holes allowing water introduced via the water inlet hole to be discharged to the bottom.

11. The laundry treating apparatus of claim 10, wherein the detergent outlet includes a first space where the detergent inlet hole is located and a second space where the water inlet hole and a detergent discharge hole are located, wherein the water diffuser crosses the first space and the second space together, and the water guide is located in the first space.

12. The laundry treating apparatus of claim 11, wherein the detergent outlet is formed as the first space protrudes rearward from the second space.

13. The laundry treating apparatus of claim 6, wherein the detergent detector includes a pair of electrodes in contact with the detergent inside the detergent outlet.

14. The laundry treating apparatus of claim 6, wherein the detergent detector is configured to detect the detergent mixed in water when water and the detergent are mixed with each other.

15. The laundry treating apparatus of claim 14, wherein the detergent detector includes an electrode sensor, wherein the laundry treating apparatus further includes a controller connected in a signal manner to the electrode sensor and configured to determine whether the detergent is mixed in water based on a measured value of the electrode sensor.

16. The laundry treating apparatus of claim 1, wherein the cabinet is equipped with a laundry inlet defined in a top surface thereof, wherein the laundry is put into the laundry inlet,

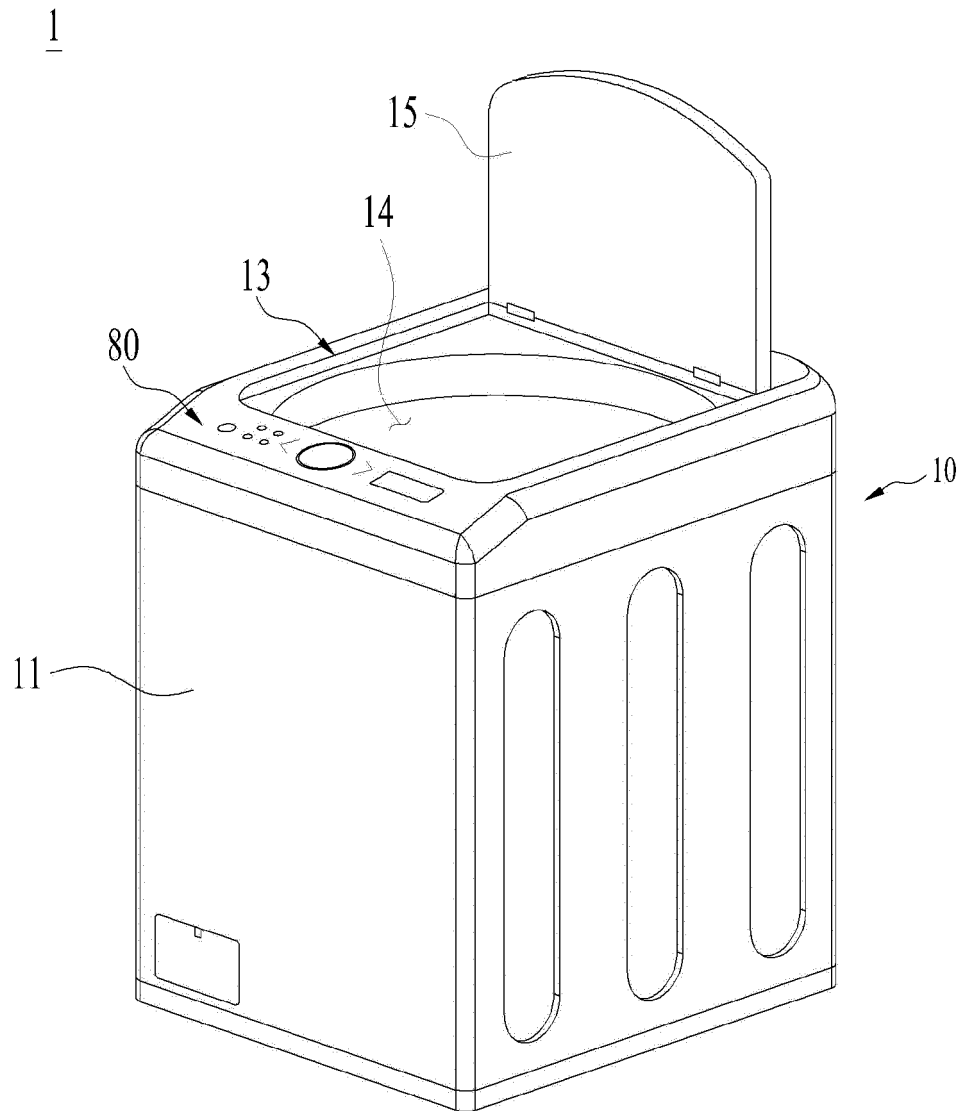
wherein the tub and the drum have open top surfaces to accommodate water and the laundry therein, respectively,

wherein the detergent outlet is located upwardly of the tub and discharges water and the detergent into the tub and the drum.

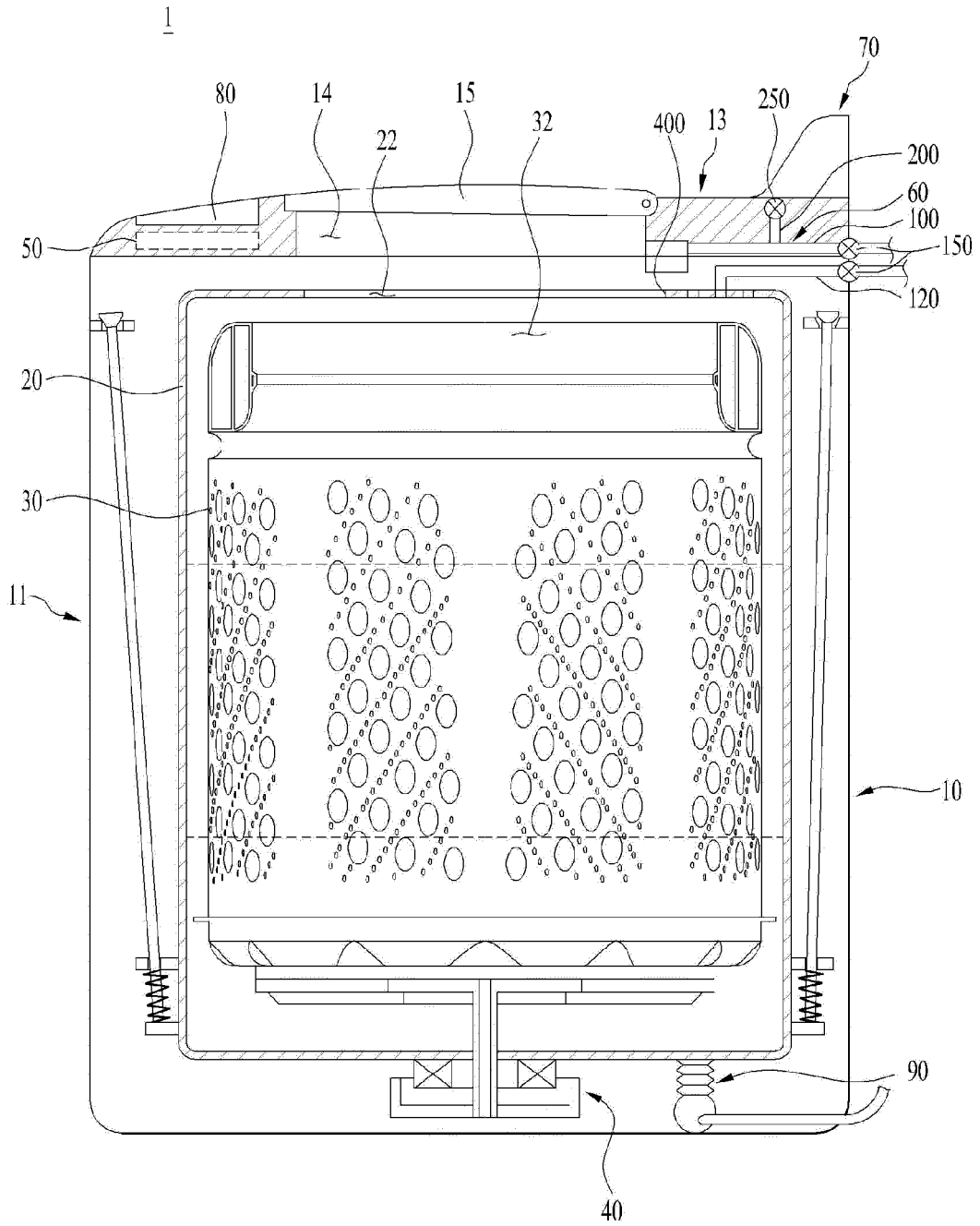
17. A laundry treating apparatus comprising:

- a cabinet;
- a tub disposed inside the cabinet and accommodating water therein;
- a drum rotatably disposed inside the tub and accommodating laundry therein;
- a detergent outlet disposed inside the cabinet, wherein the detergent outlet mixes water supplied from outside with detergent to form a mixture and discharges the mixture into the tub; and
- a detergent detector disposed in the detergent outlet and configured to detect the detergent mixed with water inside the detergent outlet.

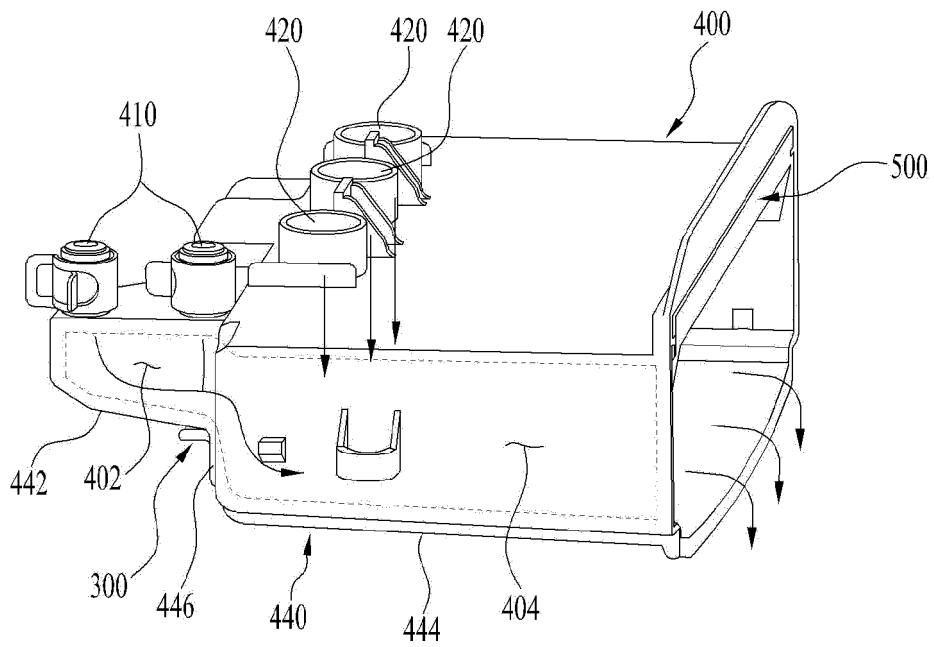
【FIG. 1】



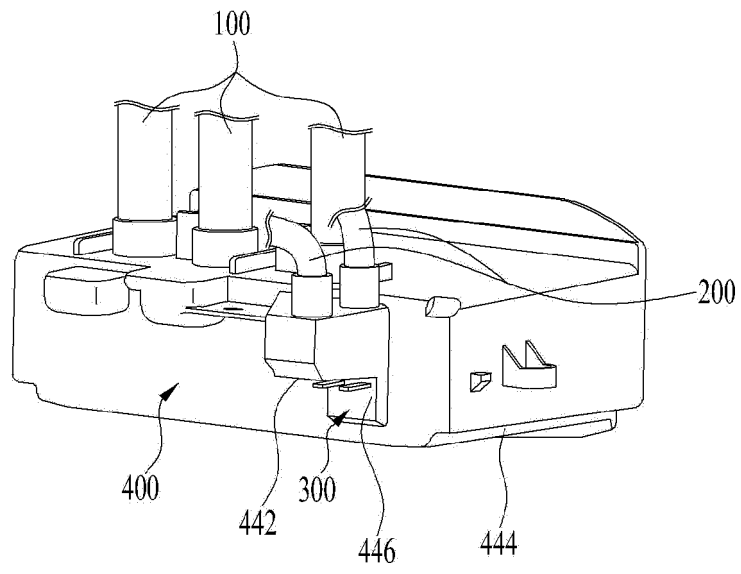
【FIG. 2】



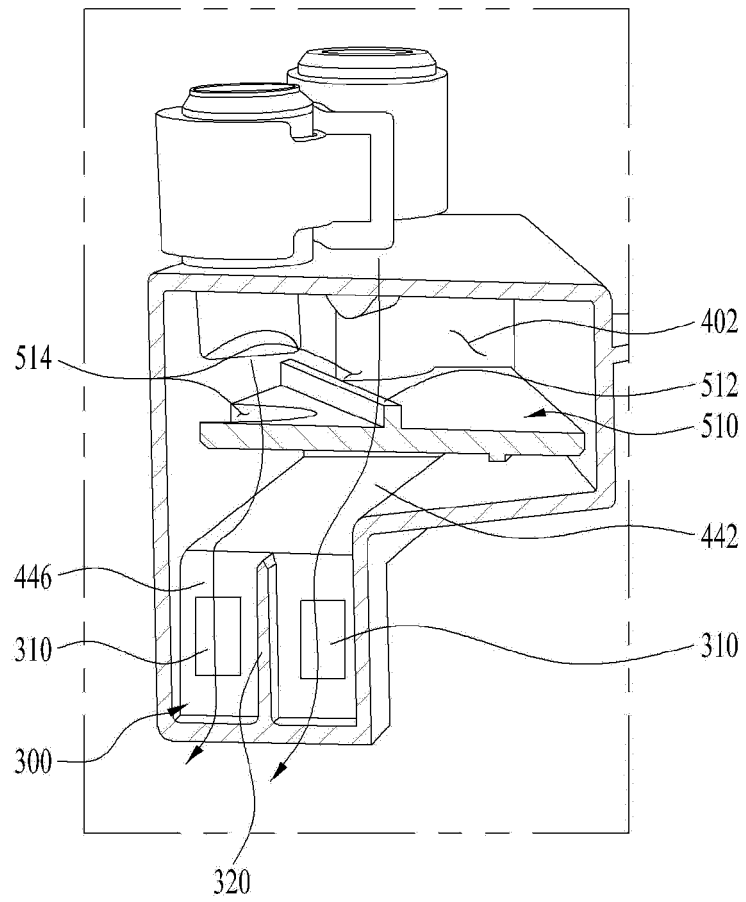
【FIG. 3】



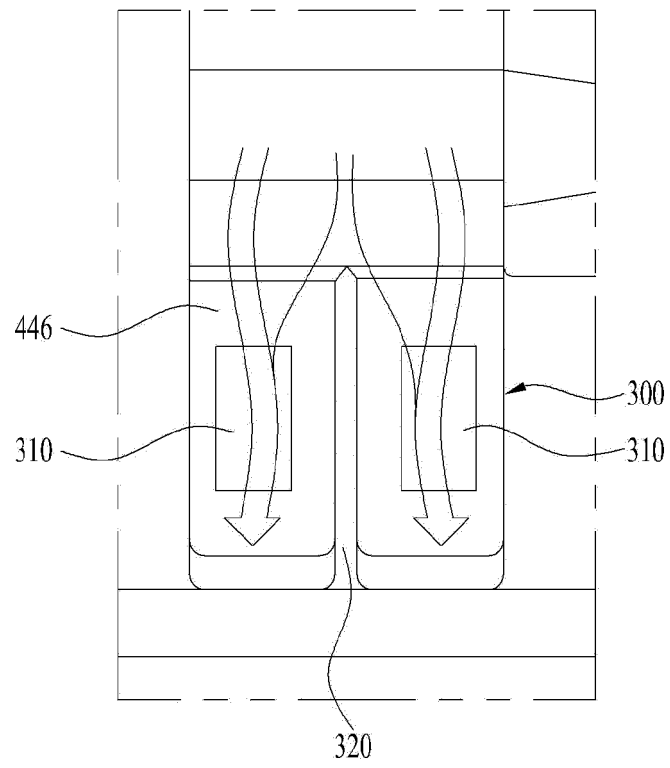
【FIG. 4】



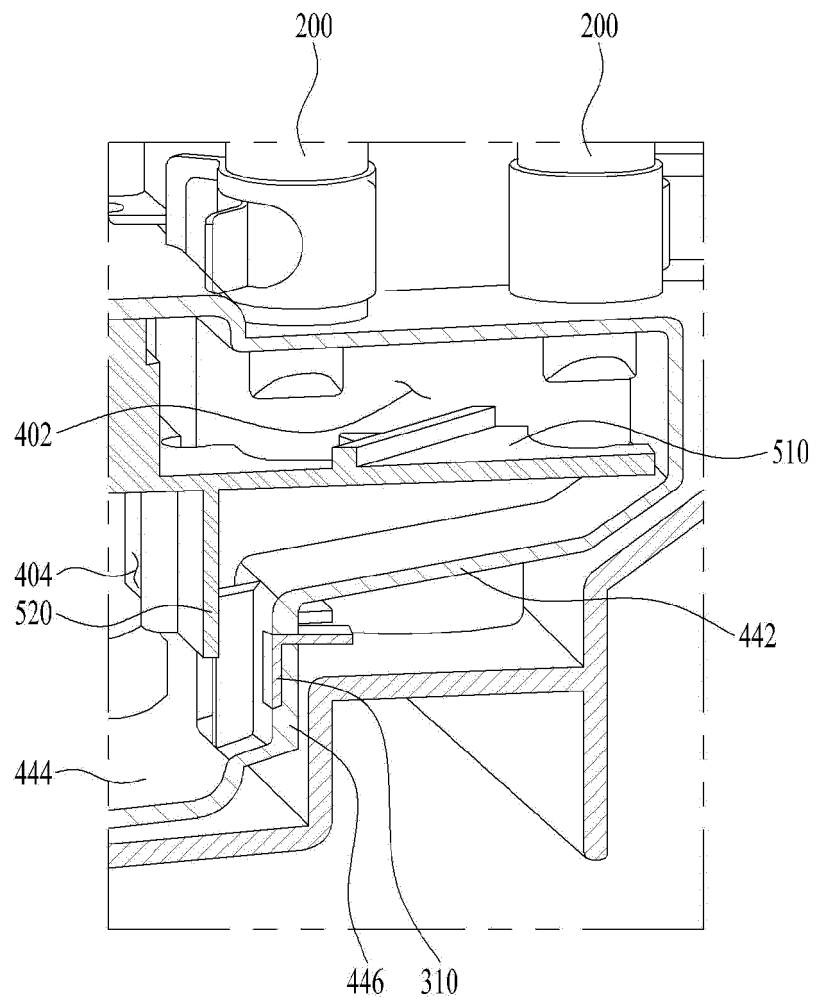
【FIG. 5】



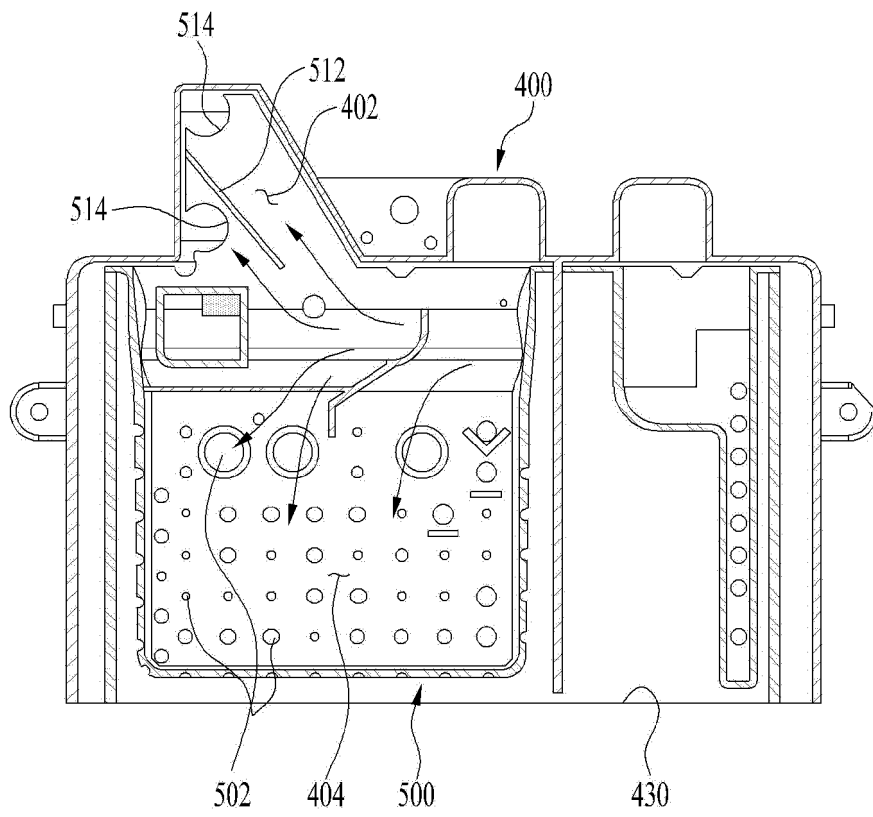
【FIG. 6】



【FIG. 7】



【FIG. 8】



INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/KR2023/000297**

<p><b>A. CLASSIFICATION OF SUBJECT MATTER</b>  <b>D06F 34/14(2020.01)i; D06F 39/02(2006.01)i; D06F 33/43(2020.01)i; D06F 33/37(2020.01)i</b></p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>																							
<p><b>B. FIELDS SEARCHED</b></p> <p>Minimum documentation searched (classification system followed by classification symbols)                  D06F 34/14(2020.01); A47L 15/44(2006.01); D06F 33/30(2020.01); D06F 39/00(2006.01); D06F 39/02(2006.01);                  D06F 39/08(2006.01)</p> <p>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</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                  eKOMPASS (KIPO internal) &amp; keywords: 의류처리장치(laundry treating apparatus), 세제(detergent), 세제저장부(detergent reservoir), 세제토출부(detergent discharge part), 세제감지부(detergent sensor), 세제유입홀(detergent inlet), 물가이드(water guide), 물확산부(water spreader), 전극(electrode)</p>																							
<p><b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b></p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>KR 10-2021-0077472 A (LG ELECTRONICS INC.) 25 June 2021 (2021-06-25) See paragraphs [0031], [0035] and [0044] and figure 1.</td> <td>1,6,13-17</td> </tr> <tr> <td>Y</td> <td></td> <td>2-3,7-8</td> </tr> <tr> <td>A</td> <td></td> <td>4-5,9-12</td> </tr> <tr> <td>Y</td> <td>JP 2021-159230 A (SHARP CORP.) 11 October 2021 (2021-10-11) See paragraph [0035] and figure 3.</td> <td>2-3,7-8</td> </tr> <tr> <td>A</td> <td>JP 2020-000403 A (TOSHIBA LIFESTYLE PRODUCTS &amp; SERVICES CORP.) 09 January 2020 (2020-01-09) See paragraphs [0007]-[0019] and figure 1.</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>JP 4331346 B2 (NIITAKA CO., LTD.) 16 September 2009 (2009-09-16) See paragraphs [0022]-[0035] and figures 1-9.</td> <td>1-17</td> </tr> </tbody> </table> <p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.      <input checked="" type="checkbox"/> See patent family annex.</p> <p>* Special categories of cited documents:                  "A" document defining the general state of the art which is not considered to be of particular relevance                  "D" document cited by the applicant in the international application                  "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                  "&amp;" document member of the same patent family</p>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	KR 10-2021-0077472 A (LG ELECTRONICS INC.) 25 June 2021 (2021-06-25) See paragraphs [0031], [0035] and [0044] and figure 1.	1,6,13-17	Y		2-3,7-8	A		4-5,9-12	Y	JP 2021-159230 A (SHARP CORP.) 11 October 2021 (2021-10-11) See paragraph [0035] and figure 3.	2-3,7-8	A	JP 2020-000403 A (TOSHIBA LIFESTYLE PRODUCTS & SERVICES CORP.) 09 January 2020 (2020-01-09) See paragraphs [0007]-[0019] and figure 1.	1-17	A	JP 4331346 B2 (NIITAKA CO., LTD.) 16 September 2009 (2009-09-16) See paragraphs [0022]-[0035] and figures 1-9.	1-17
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Y	JP 2021-159230 A (SHARP CORP.) 11 October 2021 (2021-10-11) See paragraph [0035] and figure 3.	2-3,7-8																					
A	JP 2020-000403 A (TOSHIBA LIFESTYLE PRODUCTS & SERVICES CORP.) 09 January 2020 (2020-01-09) See paragraphs [0007]-[0019] and figure 1.	1-17																					
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<p>Name and mailing address of the ISA/KR <b>Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208</b> Facsimile No. +82-42-481-8578</p>		<p>Authorized officer</p> <p>Telephone No.</p>																					

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INTERNATIONAL SEARCH REPORT

International application No. <b>PCT/KR2023/000297</b>
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