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(54) DRUM WASHING MACHINE WITH DETERGENT SUPPLY DEVICE

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(57) **ABSTRACT**

A drum washing machine having a detergent supply device supplying water containing detergent to a washing tub. The detergent supply device is integrally formed with a door of the washing machine. The detergent supply device is provided with a discharge unit discharging detergent dissolved in the water to the washing tub when the level of the water supplied to the detergent supply device reaches a designated value. The discharge unit delays the discharge of the washing water supplied to the detergent supply device by a siphon, thus improving the solubility of the detergent.

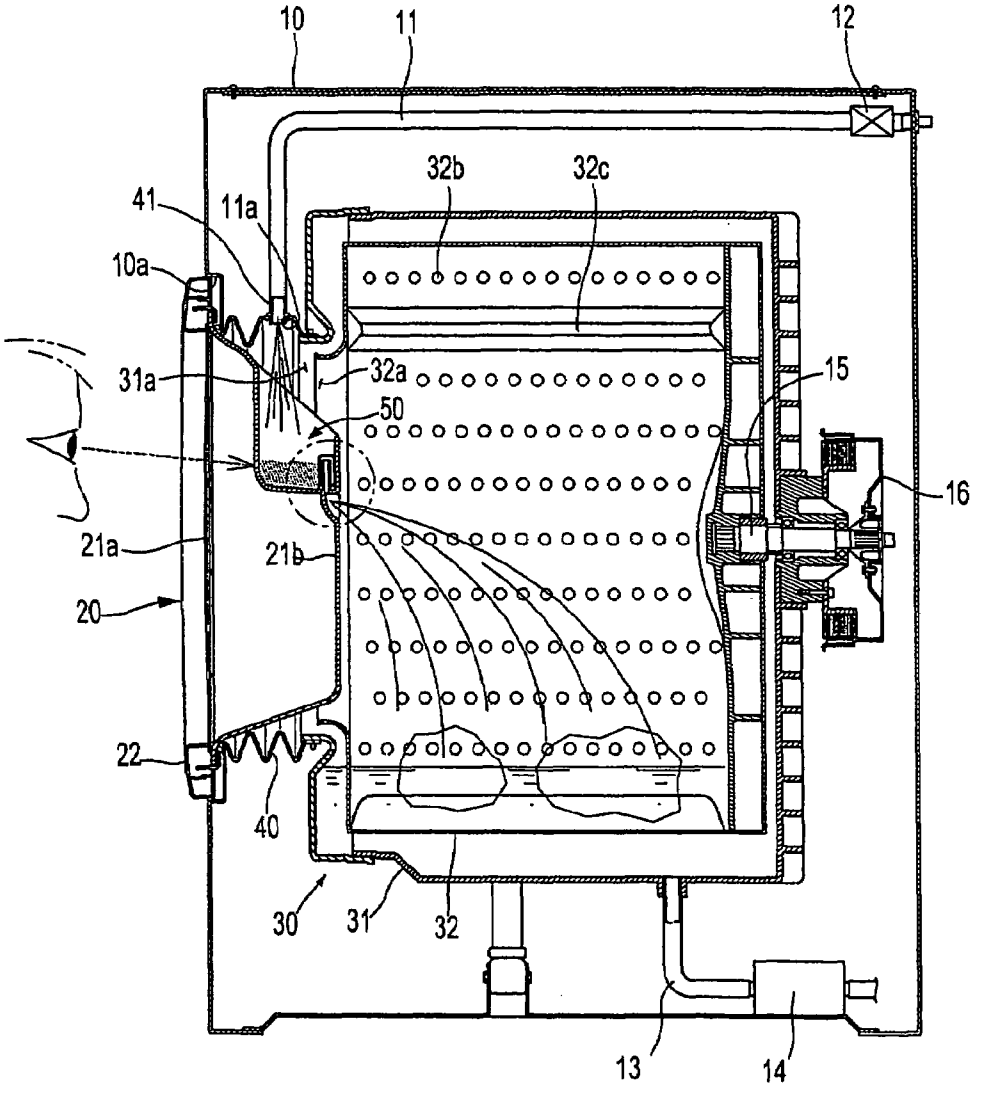

Fig.1

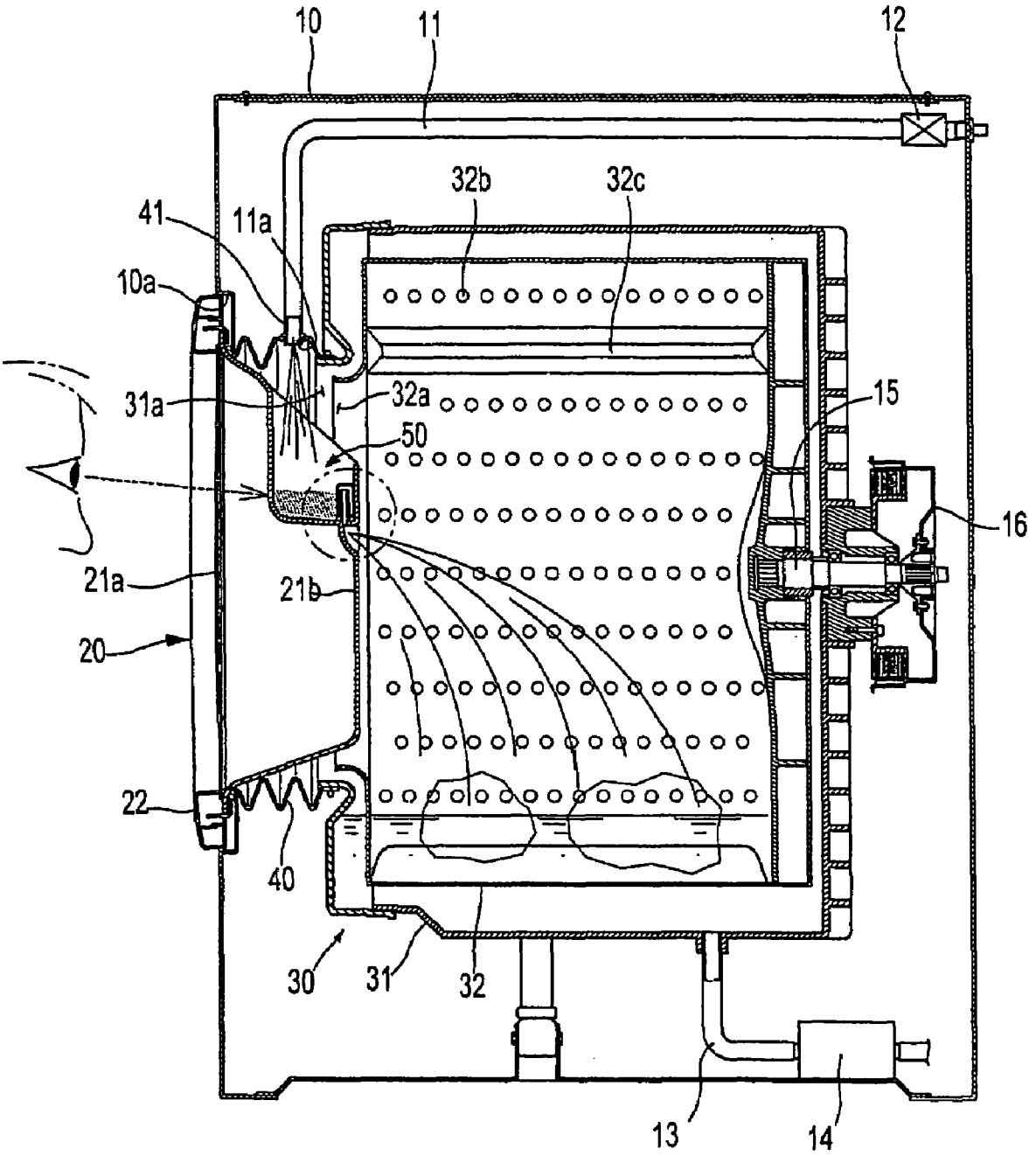
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Fig.2

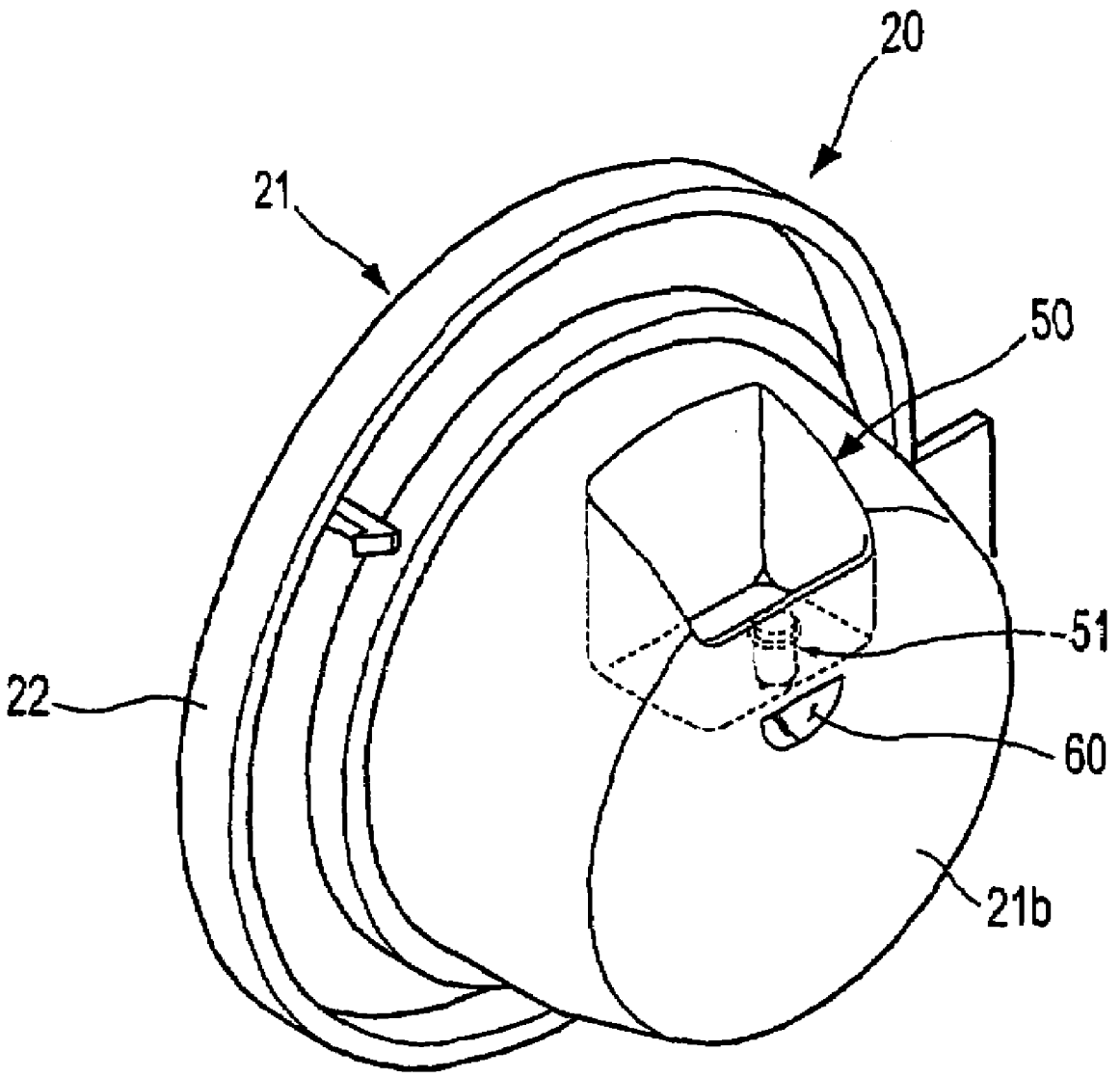


Fig.3

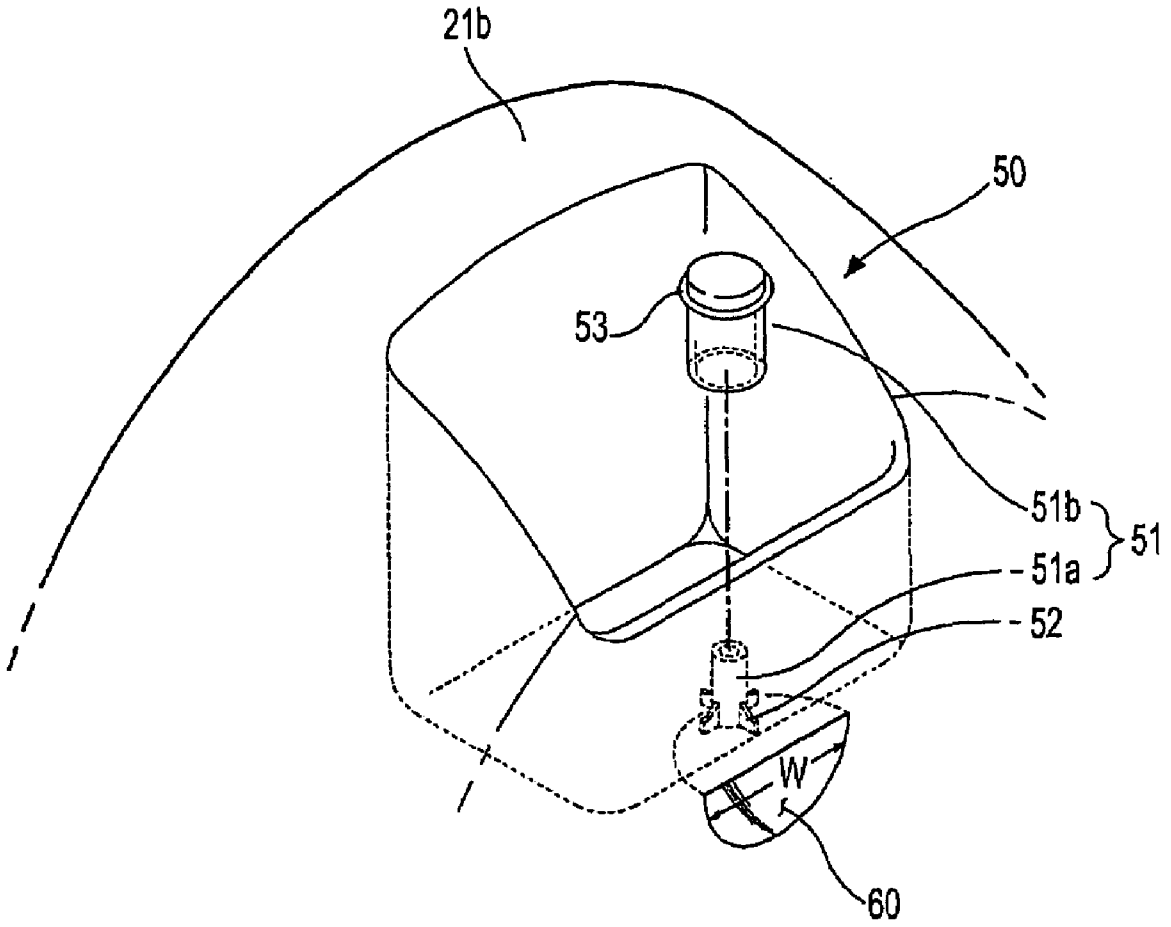


Fig.4

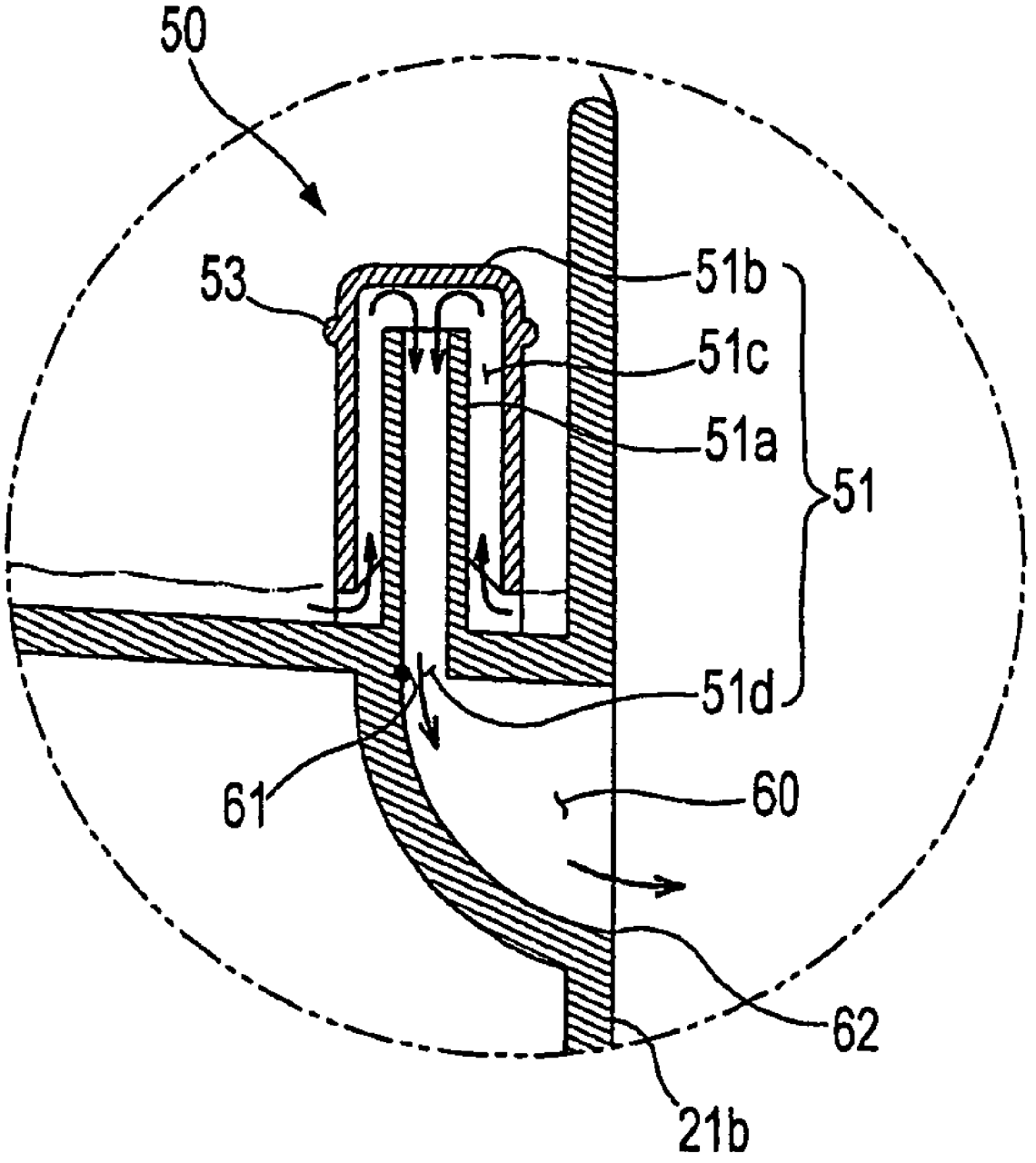


Fig.5

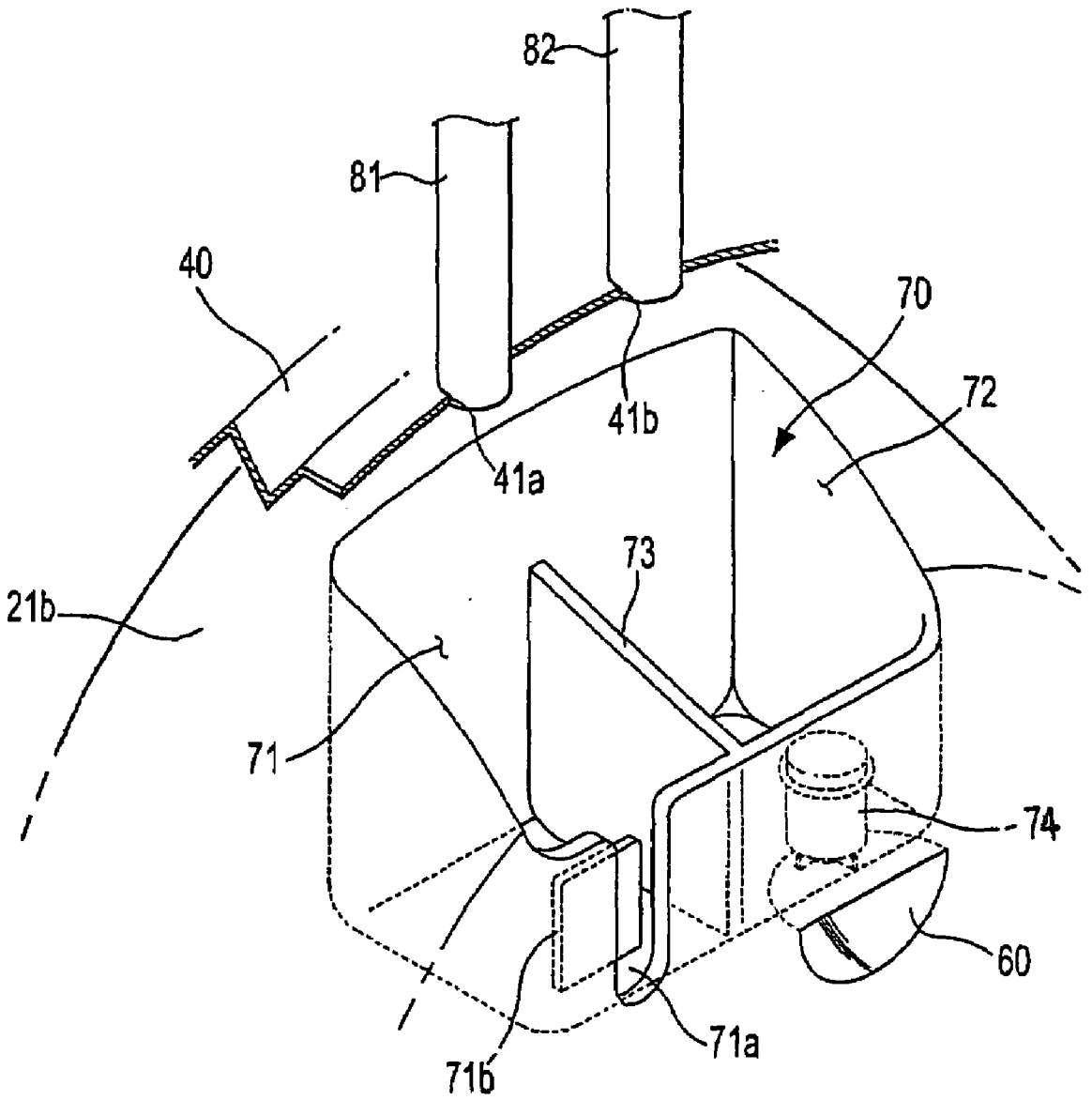
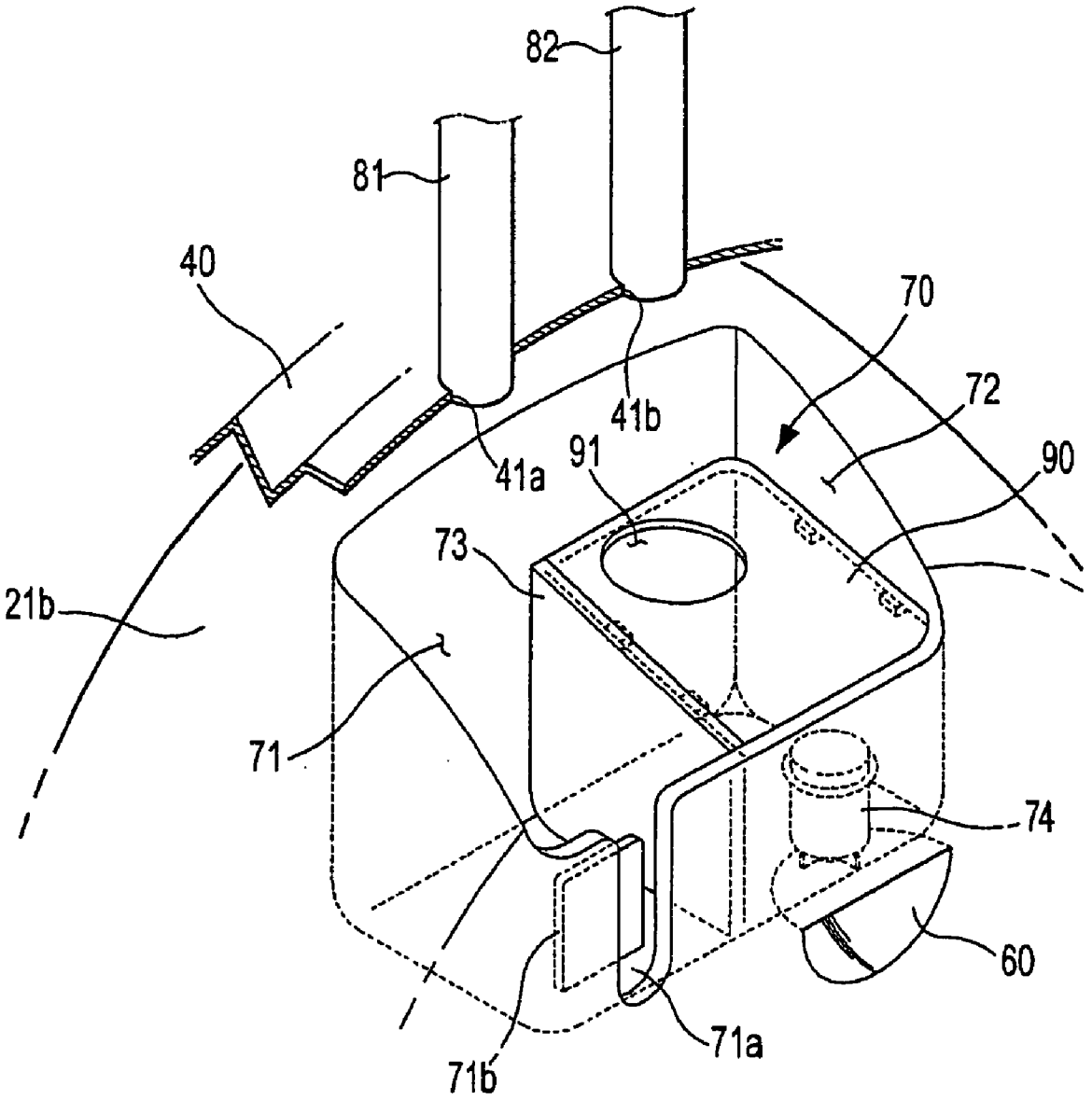


Fig.6



# DRUM WASHING MACHINE WITH DETERGENT SUPPLY DEVICE

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims the benefit of Korean Patent Application No. 2006-0033700, filed Apr. 13, 2006, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

## BACKGROUND OF THE INVENTION

**[0002]** 1. Field of the Invention

**[0003]** The present invention relates to a drum washing machine, and more particularly, to a detergent supply device to supply detergent dissolved in water to the inside of a washing tub.

**[0004]** 2. Description of the Related Art

**[0005]** Generally, a washing machine is an apparatus that washes laundry by rotating a washing tub using a motor when water and a detergent are supplied to the washing tub in which laundry is placed. The washing machine includes a detergent supply device installed at a designated side of a main body for supplying detergent together with the supply of water to the washing tub.

**[0006]** Korean Patent Publication No. 2003-9847 discloses a drum washing machine having a detergent supply device to supply detergent dissolved in water during a process to supply the water.

**[0007]** The detergent supply device of the drum washing machine of Korean Patent Publication No. 2003-9847 includes a hexahedral housing provided with an opening formed through the front surface thereof, and a detergent container detachably connected to the inside of the housing through the opening of the housing. The detergent supply device is installed in the front surface of the upper portion of a main body of the washing machine so that the detergent container is slidably inserted into and removed from the main body.

**[0008]** A water supply device to supply the water to the detergent supply device includes a plurality of water supply valves connected to an external water supply hose to control the supply of the water, a plurality of water supply pipes to connect the water supply valves and the detergent supply device, and a connection pipe to guide the water that has passed through the detergent supply device to the inside of a washing tub.

**[0009]** The above drum washing machine allows the water to be supplied to the inside of the washing tub through the detergent supply device, thereby causing the detergent that is put into the detergent supply device to be supplied to the washing tub when the detergent dissolves in the water.

**[0010]** However, the detergent supply device of the above conventional drum washing machine has several problems.

**[0011]** First, the detergent supply device is installed in an upper portion of the main body far away from the washing tub. Thus, the detergent supply device requires the connection pipe to supply the detergent to dissolve in the water to the inside of the washing tub and the detergent container slidably inserted into and removed from the main body. Accordingly, the detergent supply device has a complicated structure and requires an increased number of components, thus causing a difficulty in manufacturing the washing machine and increasing the production cost of the washing machine.

**[0012]** Second, since the washing machine has an increased size due to space occupied by the detergent supply device, space to install the washing machine is limited. Further, as the detergent container is provided with a hand grip depressed in the front surface thereof so as to slidably insert the detergent container into and remove the detergent from the main body, the hand grip may aesthetically deteriorate the external appearance of the washing machine.

**[0013]** Finally, since the detergent container is installed in the housing of the washing machine, the washing machine may be operated under the condition that a user does not put a detergent into the detergent container, and the user cannot check whether the total amount of the detergent put into the detergent container is supplied to the inside of the washing tub during operation of the washing machine.

## SUMMARY OF THE INVENTION

**[0014]** Therefore, an aspect of the invention is to provide a drum washing machine in which the structure of a detergent supply device is simplified, thus being easily manufactured and reducing the production cost of the washing machine.

**[0015]** A further aspect of the invention is to provide a drum washing machine that reduces the size of the body of the machine and has an aesthetically-improved external appearance.

**[0016]** Another aspect of the invention is to provide a drum washing machine that allows a user to see the supply of water into a tub when the water is initially supplied during a washing operation.

**[0017]** Yet another aspect of the invention is to provide a drum washing machine, which delays the discharge of water supplied to a detergent supply device, so as to improve the solubility of the detergent and to supply only the detergent dissolved in the water to the tub, thus improving the washing capacity of the washing machine.

**[0018]** Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

**[0019]** The foregoing and/or other aspects of the present invention are achieved by providing a drum washing machine including a main body provided with an opening; a washing tub installed in the body of the washing machine; a door opening and closing the opening; a detergent supply device supplying a detergent to the washing tub; and a water supply device supplying water to the detergent supply device, wherein the detergent supply device is formed in the door, and is provided with a discharge unit to discharge the detergent dissolved in the water to the washing tub when the level of the water supplied to the detergent supply device reaches a designated value.

**[0020]** The discharge unit includes a siphon tube formed through the bottom of the detergent supply device to communicate with the outside, and a siphon cap put on the siphon tube forming a siphon channel.

**[0021]** An outlet of a water supply pipe of the water supply device is connected to the upper portion of a bellows interposed between the opening of the main body and an opening of the washing tub.

**[0022]** The foregoing and/or other aspects of the present invention are achieved by providing a washing machine including a main body, provided with an opening; a washing tub installed in the main body of the washing machine; a door to open and close the opening; a detergent supply device dissolving a plurality of detergents in water and supplying the detergents dissolved in the water to the washing tub; and a water supply device supplying the water to the detergent supply device, wherein the detergent supply device is integrally formed with the door, and includes a plurality of chambers divided from each other so that each of the detergents can be respectively put into one of the plurality of chambers, and at least one chamber supplies a detergent dissolved in the water to the washing tub by a siphon.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0023]** These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings in which:

**[0024]** FIG. **1** is a sectional view of a drum washing machine of the embodiments of the present invention;

**[0025]** FIG. **2** is a perspective view of a detergent supply device of a drum washing machine in accordance with a first embodiment of the present invention;

**[0026]** FIG. **3** is an enlarged perspective view of a discharge unit of the detergent supply device of FIG. **2**;

**[0027]** FIG. **4** is a sectional view of the detergent supply device illustrating a process to discharge water containing a detergent through the discharge unit;

**[0028]** FIG. **5** is a perspective view of a detergent supply device of a drum washing machine in accordance with a second embodiment of the present invention; and

**[0029]** FIG. **6** is a perspective view of a modification of the detergent supply device of the FIG. **5**.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0030]** Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below to explain the present invention by referring to the annexed drawings.

**[0031]** As shown in FIG. **1**, a drum washing machine of a first embodiment of the present invention includes a main body **10** forming an external appearance of the drum washing machine, a door **20** connected to a front surface of the main body **10** such that the door **20** can be opened and closed so that laundry can be inserted into and removed from the main body **10** of the washing machine, and an operation unit (not shown) provided on the main body **10** above the door **20** to operate the washing machine.

**[0032]** A cylindrical washing tub **30** provided with an opening formed through the front surface thereof is installed in the main body **10** of the washing machine. The opening of the washing tub **30** faces the door **20**. The washing tub **30** has a double structure including a body **31** of the tub **30** and a drum **32**. The tub body **31** stores water required during a washing operation, and the drum **32** is rotatably installed in the tub body **31** to perform the washing operation.

**[0033]** A water supply device supplying water to the tub body **31** is installed above the tub body **31**, and a drain device draining water in the tub body **31** is installed below the tub body **31**. The water supply device includes a water supply pipe **11** and a water supply valve **12**, and the drain device includes a drain pipe **13** and a drain pump **14**.

**[0034]** The drum **32** has a drum opening **32***a* formed through the front surface thereof at a position corresponding to an opening **10***a* formed through the main body **10**, a plurality of through holes **32***b* formed through the circumferential surface thereof, and a plurality of lifters **32***c* formed on the inner surface thereof so that laundry is lifted and dropped when the drum **32** is rotated. The drum **32** is supported by a rotary shaft **15** connected to the center of the rear surface of the drum **32**. The rotary shaft **15** passes through the rear surface of the tub body **31** and extends in a rearward direction from the tub body **31**. A driving motor **16** to rotate the rotary shaft **15** is installed on the rear surface of the drum **32**.

**[0035]** The driving motor **16** rotates the drum **32** at a low speed in a regular or a reverse direction so that the laundry can be washed and rotates the drum at a high speed so that the laundry can be dehydrated.

**[0036]** An opening **31***a* is formed through the front surface of the tub body **31** at a position corresponding to the openings **10***a* and **32***a* of the main body **10** and the drum **32***a*, respectively. A cylindrical bellows **40** having a high elasticity is interposed between the opening **31***a* of the tub body **31** and the opening **10***a* of the main body **10**.

**[0037]** The bellows **40** prevents the water from leaking to a gap between the opening **31***a* of the tub **31** and the opening **10***a* of the main body **10**. Further, the bellows **40** prevents vibration of the drum **32**, generated due to the rotation of the drum **32** during the washing or rinsing operation, from being transferred to the main body **10**.

**[0038]** A connection hole **41**, to which an outlet **11***a* of the water supply pipe **11** is connected to supply the water to a detergent supply device **50** formed integrally with the door **20**, is formed through the upper portion of the bellows **40**.

**[0039]** As shown in FIGS. **2** and **3**, the door **20**, which opens and closes to cover the opening **10***a* of the main body **10**, includes a transparent window unit **21** disposed at the central portion thereof, and a door frame **22** installed at an edge portion thereof. The transparent window unit **21** is made of a transparent material so that a user located at the outside of the main body **10** can see the inside of the drum **32** through the door **20** during the washing operation. The door frame **22** has a ring shape such that the transparent window unit **21** is fixedly installed in the center of the door frame **22**.

**[0040]** The transparent window unit **21** has a double structure including a front window **21***a* installed on a front surface of the transparent window unit **21** and a rear window **21***b* installed on a rear surface of the transparent window unit **21**. Thus, a hollow is formed between the front window **21***a* and the rear window **21***b* of the transparent window unit **21**. The rear window **21***b* has a dome shape and protrudes from the door frame **22** toward the opening **32***a* of the drum **32**.

**[0041]** In the drum washing machine of the first embodiment of the present invention, the detergent supply device **50** is formed integrally with the door **20**, particularly with the dome-shaped rear window **21***b* protruded toward the opening **32***a* of the drum **32** so the detergent dissolved in the

water in the detergent supply device **50** can be supplied directly to the inside of the washing tub **30**.

**[0042]** The detergent supply device **50** is formed in an upper part of the rear window **21***b* adjacent to an outlet **11***a* of the water supply pipe **11** so that the water can be stably supplied from the water supply pipe **11**, which is connected to the upper surface of the bellows **40**, to the detergent supply device **50**. The detergent supply device **50** is depressed in the upper part of the rear window **21***b* to a designated depth, and the upper surface of the detergent supply device **50** is able to be opened so that the detergent supply device **50** can contain the water and the detergent.

**[0043]** Thereby, after a user opens the door **20** and puts laundry into the drum **32**, the user can put the detergent into the detergent supply device **50** formed in the door **20** while the door **20** is open. Then, the detergent put into the detergent supply device **50** can be dissolved in the water and be supplied directly to the inside of the washing tub **30**.

**[0044]** Accordingly, the drum washing machine of the first embodiment of the present invention does not require a detergent supply device that is provided separately from the main body **10**, thus having a more simplified structure. Since the door **20** is opened and the detergent is put into the detergent supply device **50**, so as to supply the detergent to the drum washing machine, the drum washing machine of the first embodiment of the present invention facilitates the supply of the detergent. Further, since the front window **21***a*, the rear window **21***b*, and the detergent supply device **50** are made of a transparent material, the drum washing machine of the first embodiment of the present invention allows a user to see the supply state of the detergent during the washing operation.

**[0045]** For this reason, the rear window **21***b* is manufactured by injection-molding an acrylic resin, such as, for example, polymethyl methacrylate (PMMA). The detergent supply device **50** is molded integrally with the rear window **21***b* during the manufacturing of the rear window **21***b*. PMMA has high transparency and heat-resistance and is easily manufactured into a product by injection molding, thus being easily molded into the rear window **21***b*.

**[0046]** As shown in FIGS. **3** and **4**, the detergent supply device **50** in accordance with a first embodiment of the present invention includes a discharge unit **51** to discharge the detergent that is dissolved in the water to the inside of the washing tub **30**. The discharge unit **51** includes a siphon tube **51***a* having a cylindrical shape, a siphon cap **51***b*, and a plurality of interval-maintaining ribs **52**, so that the water can be siphoned out of the detergent supply device **50**. The siphon tube **51***a*, which connects the inside and the outside of the detergent supply device **50**, is formed on the bottom of the detergent supply device **50**. The siphon cap **51***b* is put on the siphon tube **51***a* in such a manner that the inner surface of the siphon cap **51***b* is separated from the outer circumferential surface and the upper end of the siphon tube **51***a*, thus forming a siphon channel **51***c* therebetween. The ribs **52** are disposed on the outer circumferential surface of the siphon tube **51***a* in a radial direction in such a manner that upper surfaces of the ribs **52** are inclined. The ribs **52** separate the outer circumferential surface of the siphon tube **51***a* from the inner circumferential surface of the siphon cap **51***b* by a designated space, and separate the siphon cap **51***b* from the bottom surface of the detergent supply device **50** by a designated space.

**[0047]** Hereinafter, the supply of the detergent to the washing machine through the above-described detergent supply device **50** of the first embodiment will be described. As the water is supplied to the detergent supply device **50**, the detergent in the detergent supply device **50** dissolves in the water. Thereby, the level of the water in the detergent supply device **50** is elevated. When the level of the water in the detergent supply device **50** reaches a designated value, the water containing the detergent, which has been dissolved therein through the siphon channel **51***c* formed between the siphon tube **51***a* and the siphon cap **51***b*, is discharged to the outside of the detergent supply device **50** through the siphon tube **51***a*. The water containing the detergent is continuously discharged to the outside of the detergent supply device **50** through the siphon tube **51***a* until the level of the water containing the detergent in the detergent supply device **50** is lower than the lower end of the siphon cap **51***b*. A detergent indicator **53** horizontally protrudes from the upper portion of the outer circumferential surface of the siphon cap **51***b*, thus indicating the proper amount of the detergent to be put into the detergent supply device **50**.

**[0048]** A guide portion **60** to guide the water containing the detergent, which is discharged through the siphon tube **51***a* to the washing tub **30**, is formed in the rear window **21***b* of the door **20** below the detergent supply device **50**. The guide portion **60** is inclined at a designated angle in such a manner that an upper part of the guide portion **60** faces the main body **10** and the lower part of the guide portion **60** faces the washing tub **30**, thus increasing the speed of a current of the water flowing along the guide portion **60**. Thus, the water is uniformly supplied to the inside of the washing tub **30**. In more detail, the guide portion **60** is inclined in such a manner that an upper end **61** of the guide portion **60** faces the front surface of the door **20** so that an outlet **51***d* of the siphon tube **51***a* can be exposed to the outside, and a lower end **62** of the guide portion **60** reaches the protruding surface of the rear window **21***b*. The guide portion **60** is inclined in a gentle curved line so that the washing water can smoothly flow along the guide portion **60**. The width of the guide portion **60** decreases from the upper portion thereof to the lower portion thereof, thus increasing the speed of the current of the water flowing along the guide portion **60**. More specifically, the width of the guide portion **60** gradually decreases from the upper portion thereof to the lower portion thereof so that the cross section of the guide portion **60** has a semicircular shape.

**[0049]** In the same manner as the detergent supply portion **50**, the guide portion **60** is formed integrally with the rear window **21***b* during the manufacturing of the rear window **21***b*.

**[0050]** FIG. **5** illustrates a detergent supply device **70** of a washing machine in accordance with a second embodiment of the present invention. The detergent supply device **70** includes a plurality of chambers **71** and **72**, which are divided from each other so that various kinds of detergents can be respectively put into the plurality of chambers **71** and **72**.

**[0051]** The plurality of chambers **71** and **72** include a detergent chamber **71** and a softener chamber **72**, which are divided by a partition **73**. The detergent chamber **71** stores a detergent used in a washing operation, and a softener chamber **72** stores a fabric softener used in a rinsing operation.

**[0052]** Generally, the detergent used in the washing operation has a powdery state, and the fabric softener used in the rinsing operation has a liquid state. Accordingly, a discharge hole **71***a* discharging the detergent dissolved in the water is formed through the rear surface of the detergent chamber **71**, and a siphon unit **74** to discharge the fabric softener by a siphon is installed in the softener chamber **72**.

**[0053]** Connection holes **41***a* and **41***b*, to which water supply pipes **81** and **82** are connected, that supply the water to the chambers **71** and **72** are formed through an upper portion of the bellows **40**, and are interposed between the opening **31***a* of the tub body **31** and the opening **10***a* of the main body **10** at positions corresponding to the chambers **71** and **72**. That is, a first connection hole **41***a*, to which a first water supply pipe **81** is connected to supply the water to the detergent chamber **71** is formed through the upper portion of the bellows **40** at a position corresponding to the detergent chamber **71**. Further, a second connection hole **41***b*, to which a second water supply pipe **82** is connected, to supply the water to the softener chamber **72** is formed through the upper portion of the bellows **40** at a position corresponding to the softener chamber **72**. The first and second water supply pipes **81** and **82** are opened and closed by water supply valves (not shown) controlled by a controller (not shown).

**[0054]** A flow delay unit **71***b* is installed at the front of the discharge hole **71***a* formed through the detergent chamber **71**. The flow delay unit **71***b* prevents the detergent in a powdery state from flowing through the discharge hole **71***a* and delays the discharge of the water, thus improving the solubility of the detergent.

**[0055]** As shown in FIG. **6**, a chamber lid **90** may be connected to the open upper surface of the softener chamber **72** so as to prevent water supplied to the detergent chamber **71** from flowing the detergent chamber **71** into the softener chamber **72**. A hole **91** is formed through the chamber lid **90** at a position corresponding to the second water supply pipe **82** so that water can be supplied from the second water supply pipe **82** to the softener chamber **72**.

**[0056]** The chamber lid **90** may be formed integrally with the detergent supply device **50**, or connected detachably to the detergent supply device **50**.

**[0057]** Hereinafter, the supply of the detergent and the fabric softener to the washing machine through the above-described detergent supply device **70** of the second embodiment will be described. The door **20** is opened, and laundry is put into the drum **32**. After the detergent and the fabric softener are respectively put into the detergent chamber **71** and the softener chamber **72** of the detergent supply device **70** formed in the door **20**, the door **20** is closed and the washing machine is operated. Then, water is supplied to the detergent chamber **71** through the first water supply pipe **81**, and the detergent in the detergent chamber **71** dissolves in the water. The water containing the detergent is supplied to the inside of the washing tub **30** through the discharge hole **71***a*. When the water containing the detergent fills the tub body **31**, the drum **32** is rotated to perform a washing operation.

**[0058]** After the washing operation has been completed, water is supplied to the softener chamber **72** through the second water supply pipe **82**, and the fabric softener in the softener chamber **72** dissolves in the water. The water containing the fabric softener is supplied to the inside of the washing tub **30** through the siphon unit **74**. When the water containing the fabric softener fills the tub body **31**, the drum **32** is rotated to perform a rinsing operation. After the rinsing operation has been completed, a dehydrating operation is performed. Thereby, one washing cycle to wash the laundry is completed. The opening and closing of the water supply valves (not shown) is programmed in such a manner that the supply of the water is performed only through the first water supply pipe **81** during the washing operation, and the supply of the water is performed only through the second water supply pipe **82** during the rinsing operation. Thereby, the detergent and the fabric softener are properly supplied to the washing tub **30** according to the operations.

**[0059]** Other elements of the detergent supply device **70** of the second embodiment are the same as those of the detergent supply device **50** of the first embodiment except for the chambers **71** and **72**, the discharge hole **71***a* that discharges the detergent dissolved in the water, the flow delay unit **71***b*, and the second water supply pipe **82**, and a detailed description thereof will be thus omitted.

**[0060]** Instead of the discharge hole **71***a* to discharge the detergent dissolved in the water to the outside of the detergent chamber **71**, a siphon unit **72***b* to discharge the detergent by the siphon may be installed in the detergent chamber **71**.

**[0061]** As is apparent from the above description, the embodiments of the present invention provide a drum washing machine in which a detergent supply device is formed integrally with a door, thus not requiring a conventional drawer-type detergent container and other elements, such as a connection pipe. Accordingly, compared to a conventional detergent supply device, the detergent supply device has a simplified structure, thus causing the drum washing machine to be easily manufactured and reducing the production costs of the drum washing machine.

**[0062]** Therefore, a space in a main body of the drum washing machine, which is occupied by the detergent supply device is decreased, thus increasing space utility. Further, the size of the main body of the washing machine is decreased, thus reducing the limit in the space to install the washing machine. Moreover, the detergent supply device is installed in a door, thus aesthetically improving the external appearance of the drum washing machine.

**[0063]** The detergent supply device, which is formed integrally with a transparent window unit of the door, allows a user to see the supply of detergent during the supply of water.

**[0064]** Thus, the siphon unit installed in the detergent supply device to delay the discharge of the water thus improves the solubility of the detergent. Further, the siphon unit supplies only the detergent dissolved in the water to the inside of a washing tub, thus improving the washing capacity of the washing machine.

**[0065]** Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

What is claimed is:

**1**. A washing machine comprising:

a main body provided with an opening;

a washing tub installed in the main body;

a door opening and closing the opening;

a detergent supply device supplying detergent to the washing tub and including a discharge unit to discharge the detergent; and

a water supply device supplying water to the detergent supply device,

wherein the detergent supply device is formed in the door and the discharge unit discharges the detergent dissolved in the water to the washing tub when a level of the water supplied to the detergent supply device reaches a designated value.

**2**. The washing machine according to claim **1**, wherein the detergent supply device is integrally formed with the door.

**3**. The washing machine according to claim **1**, wherein the discharge unit includes a siphon which supplies the detergent dissolved in the water to the washing tub.

**4**. The washing machine according to claim **1**, wherein the detergent supply device is formed in an upper portion of a rear surface of the door.

**5**. The washing machine according to claim **1**, wherein the detergent supply device is depressed in the door to a designated depth when an upper portion of the detergent supply device is opened so as to contain the detergent.

**6**. The washing machine according to claim **1**, wherein the discharge unit includes a siphon tube formed through a bottom of the detergent supply device to communicate with an outside, and a siphon cap put on the siphon tube to form a siphon channel.

**7**. The washing machine according to claim **6**, further comprising a detergent indicator formed on the siphon cap indicating a proper amount of the detergent to be put into the detergent supply device.

**8**. The washing machine according to claim **6**, further comprising an inclined guide portion that is formed in the door below the detergent supply device, the inclined guide portion guiding the detergent, dissolved in the water that is supplied from the siphon tube, to the washing tub.

**9**. The washing machine according to claim **4**, wherein the upper portion of the detergent supply device includes an outlet of a water supply pipe of the water supply device located thereon.

**10**. The washing machine according to claim **9**, further comprising an elastic bellows having a cylindrical shape interposed between an opening of the main body and an opening of the washing tub, wherein the outlet of the water supply pipe is connected to an upper portion of the bellows.

**11**. The washing machine according to claim **1**, wherein the door is made of a transparent material so that a user can see the inside of the main body.

**12**. A washing machine comprising:

a main body provided with an opening;

a washing tub installed in the main body;

a door opening and closing the opening;

a detergent supply device to dissolve a plurality of detergents in water and supply the detergents dissolved in the water to the washing tub, the detergent supply device including:

a plurality of divided chambers divided from each other so that each one of the detergents is received in a respective one of the divided chambers, and

a siphon; and

a water supply device supplying the water to the detergent supply device,

wherein the detergent supply device is formed integrally with the door, and at least one chamber supplies one of the detergents to dissolve in the water to the washing tub by the siphon.

**13**. The washing machine according to claim **12**, wherein the detergent supply device is depressed in the door to a designated depth when an upper portion of the detergent supply device is opened to contain the detergents.

**14**. The washing machine according to claim **12**, wherein the chamber, which supplies the detergent dissolved in the water to the washing tub by the siphon, includes a siphon tube formed through a bottom of the chamber to communicate with an outside and a siphon cap to be put on the siphon tube to form a siphon channel.

**15**. The washing machine according to claim **13**, further comprising a chamber lid, provided with a hole, to close the opened upper portion of the detergent supply device, the chamber lid being connected to the detergent supply device.

**16**. The washing machine according to claim **15**, wherein the chamber lid is connected to one of the chambers to supply the detergent dissolved in the water to the washing tub by the siphon.

**17**. The washing machine according to claim **14**, further comprising an inclined guide portion formed in the door below the detergent supply device, the inclined guide portion guiding the detergent, which is dissolved in the water in the detergent supply device, to the washing tub.

**18**. The washing machine according to claim **12**, wherein the door is made of a transparent material so that a user can see an inside of the main body.

**19**. A washing machine, comprising:

a door;

a washing tub; and

a detergent supply device formed in the door and supplying a detergent, the detergent supply device including a discharge unit discharging detergent dissolved in water to the washing tub when a level of the water supplied to the detergent supply device reaches a designated value.

**20**. A detergent supply device used with a washing machine having a window and a washing tub, comprising:

a discharge unit; and

an inclined guide portion formed in the window of the washing machine,

wherein detergent supplied in the detergent supply device and dissolved in water supplied to the detergent supply device is siphoned through the discharge unit to the inclined guide portion to supply the detergent dissolved in the water to the washing tub of the washing machine.

**21**. The detergent supply device according to claim **20**, wherein a width of the inclined guide portion decreases from an upper end of the guide portion to a lower end of the guide portion, such that a speed of a current of the water with the dissolved detergent flowing along the guide portion increases.

**22**. The detergent supply device according to claim **20**, further comprising a plurality of detergent chambers partitioned from each other, wherein the discharge unit is disposed within at least a first of the detergent chambers and the inclined guide portion is formed adjacent to the discharge unit.

**23**. The detergent supply device according to claim **22**, further comprising a flow delay unit disposed within at least a second of the detergent chambers and a discharge hole formed through a rear surface of the second of the detergent chambers, the flow delay unit installed in front of the discharge hole and delaying a discharge of the water through the discharge hole.

**24**. The detergent supply device according to claim **22**, further comprising a chamber lid provided with a hole, the chamber lid covering an opened upper portion of one of the detergent chambers.

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