



(51) International Patent Classification:

B65D 90/26 (2006.01) G05D 9/00 (2006.01)
E03B 11/00 (2006.01)

(21) International Application Number:

PCT/KR2011/004809

(22) International Filing Date:

30 June 2011 (30.06.2011)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10-2011-0017921

28 February 2011 (28.02.2011)

KR

10-2011-0063751 29 June 2011 (29.06.2011)

KR

(71) Applicant (for all designated States except US):

WOONGJIN COWAY CO., LTD. [KR/KR]; 658
Yougu-ri, Yougu-eup, Gongjoo, Choongcheongnam-do
314-895 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): JEON, Doo-Youl
[KR/KR]; Woongjin Coway R&D Center, Seoul National
Univ. Research Park, San 4-1, Nakseongdae-dong,
Gwanak-gu, Seoul 151-851 (KR). HONG, Hyun-Jin
[KR/KR]; Woongjin Coway R&D Center, Seoul National
Univ. Research Park, San 4-1, Nakseongdae-dong,
Gwanak-gu, Seoul 151-851 (KR).

(74) Agent: C&S PATENT AND LAW OFFICE; 13th Floor,
Seocho-Pyunghwa Building, 1451-34 Seocho-dong,
Seocho-gu, Seoul 137-070 (KR).

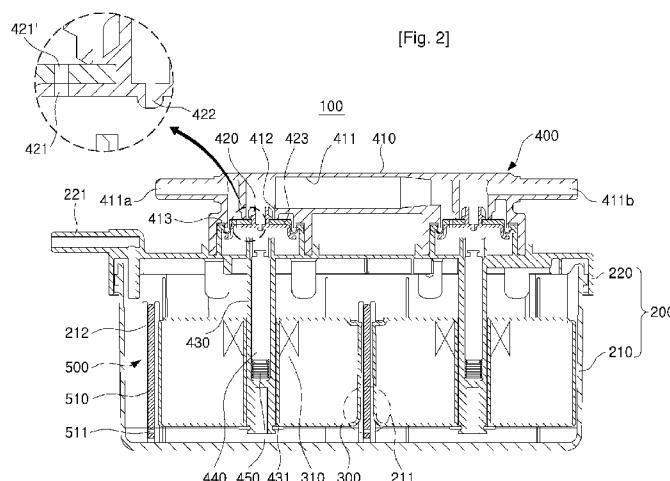
(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ,
LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK,
SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG,
ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: WATER LEVEL CONTROL APPARATUS



(57) Abstract: The present invention includes: main body provided with a water supply member through which water flows into and a connection member connected to a water storage tank; one or more float-feeds which are provided inside the main body and movable upwardly and downwardly depending on a water level of the main body; opening-closing section in which a fluid path, one side of which is connected to a water supply source and the other side of which is connected the water supply member, is formed, and which is provided in the main body to be associated with the one or more float-feeds and opens and closes the fluid path depending on a water level of the water storage tank; and guide section which is provided inside the main body adjacent to the water supply member and guides water to be introduced without influencing upward and downward movements of the float-feed.

Description

Title of Invention: WATER LEVEL CONTROL APPARATUS

Technical Field

- [1] The present invention relates to a water level control apparatus which is connected to a water storage tank and opens and closes a fluid path connected to a water supply source depending on upward and downward movements of a float-feed to control a water level of a water storage tank, and more particularly, to a water level control apparatus through which water is flowed to the water level control apparatus without influencing upward and downward movements of the float-feed and the water level of the water storage tank may be controlled reliably.

Background Art

- [2] A water level control apparatus refers to an apparatus for controlling a water level of a water storage tank, and may be classified as an electronic water level control apparatus or a mechanical water level control apparatus.
- [3] The electronic water level control apparatus is connected to a water level sensor one or more of which are provided in a water storage tank and a fluid path connected to a water supply source is opened and closed depending on a water level of the water storage tank to supply water to the water storage tank or interrupt water supply to the water storage tank to control the water level of the water storage tank.
- [4] Additionally, in a mechanical water level control apparatus, a fluid path connected to a water supply source is opened and closed by a float-feed which is moved upwardly and downwardly depending on a water level of a water storage tank to supply water to the water storage tank, or to interrupt water supply to control a water level of the water storage tank.
- [5] These water level control apparatuses may be provided inside the water storage tank, or may be connected to the water storage tank and arranged outside the water storage tank.
- [6] In a case of a conventional mechanical water level control apparatus connected to a water storagetank and arranged outside the water storage tank, through which a water level of the water storage tank is controlled by a float-feed which is moved upwardly and downwardly, depending on a water level of the water storage tank, there arises a problem, in that water introduced into the water level control apparatus influences upward and downward movement of the float-feed. In particular, when water flows into an upper portion of the water level control apparatus, the problem may become serious.
- [7] That is, when a water level of the water level control apparatus is raised through the

introduction of water to the water level control apparatus to move the float-feed upwardly, there may arise a problem in that water may flow to an upper portion of the float-feed and thus the float-feed may not be properly moved upwardly.

[8] In addition, while the float-feed is moved upwardly through the introduction of water to the water level control apparatus, the float-feed may be vibrated to damage the float-feed and the water level control apparatus. In particular, this problem may become serious when a size of the float-feed is similar to the water level control apparatus provided with the float-feed.

[9] As a result, a fluid path connected to a water supply source may not be smoothly opened and closed through upward and downward movements of the float-feed, and thus, the water level control of the water storage tank such as supplying water to the water storage tank or interrupting water supply thereto may not be performed reliably.

[10] That is, even when the water level of the water storage tank is full and water supply to the water storage tank needs to be stopped by the water level control apparatus, the water supply to the water storage tank may not be stopped.

[11] As a result, there may arise a problem in that water may be stored in the water storage tank at a level higher than a full level of the water storage tank and thus the water storage tank may overflow.

Disclosure of Invention

Technical Problem

[12] The present invention is anticipated in consideration of at least one of requests or problems related to the prior water level control apparatus.

[13] An aspect of the present invention provides a water level control apparatus in which water is introduced into the water level control apparatus without influencing upward and downward movement of the float-feed.

[14] Another aspect of the present invention provides a water level control apparatus in which the float-feed is reliably moved upwardly and downwardly depending on a water level of the water storage tank.

[15] Another aspect of the present invention provides a water level control apparatus in which a water level of the water storage tank is reliably controlled.

Solution to Problem

[16] A water level control apparatus in relation to one embodiment for implementing at least one object among the previously mentioned objects has the following features.

[17] The present invention is based on a configuration through which water is introduced into the water level control apparatus without influencing upward and downward movements of the float-feed and thus a water level of the water storage tank may be controlled reliably.

- [18] According to an aspect of the present invention, there is provided a water level control apparatus including: a main body provided with a water supply member through which water flows into and a connection member connected to water storage tank; one or more float-feeds which are provided inside the main body and movable upwardly and downwardly depending on a water level of the main body; an opening-closing section in which a fluid path, one side of which is connected to a water supply source and the other side of which is connected the water supply member, is formed, and which is provided in the main body to be associated with the one or more float-feeds and opens and closes the fluid path depending on a water level of the water storage tank; and a guide section which is provided inside the main body adjacent to the water supply member and guides water to be introduced without influencing upward and downward movements of the float-feed.
- [19] In this case, the main body may include: a body member an upper portion of which is opened and in which the connection member is provided and the one or more float-feeds are provided to be movable upwardly and downwardly and a cover member which is connected to the body member to cover the opened upper portion of the body member and in which the water supply member is provided.
- [20] The guide section on a lower portion of which one or more passage holes through which water passes are formed, and which includes one or more partition placed at a predetermined distance from a lower portion of the main body.
- [21] Furthermore, one or more float-feeds may be provided inside the main body, the water supply member may be provided in an upper portion of the main body between the float-feeds, and the guide section may include a partition which is provided inside the main body between the float-feeds, a section of which is shaped to guide water introduced into the main body through the water supply member to be flowed to a lower portion of the main body, and in which one or more passage holes through which water passes are formed.
- [22] A section of the partition may have a "  " shape.
- [23] The guide section may include a guide member, one side of which is connected to the water supply member and the other side of which is placed inside the main body and under a center of the main body.
- [24] In addition, the opening-closing section may include: an opening-closing section body in which the fluid path, a connection hole connected to the fluid path, and a chamber which is connected to an upper portion or a lower portion of the main body, are formed; a sealing member which is provided in the chamber to seal the connection hole, and in which a communicating hole communicated to the fluid path and an opening and closing hole communicated to the connection hole are formed a float-feed guide member, one side of which is arranged on an upper portion or a lower portion of

the main body to be connected to the chamber and the other side of which penetrates into the float-feed provided with a magnet, or to which the float-feed is connected to be movably upwardly and downwardly and an upward and downward movement member which is provided movably upwardly and downwardly inside the float-feed guide member and is moved upward and downward through magnetic force induced from the magnet depending on upward and downward movements of the float-feed to open and close the opening and closing hole.

[25] Furthermore, the opening-closing section may further include an elastic member which is provided inside the float-feed guide member to elastically support the upward and downward movement member.

[26] Additionally, the upward and downward movement member may be made of a magnet on which a plurality of steps are formed, or may be provided with a plurality of magnets which are spaced at a predetermined distance.

[27] Meanwhile, the float-feed may be separably connected to the float-feed guide member.

[28] Meanwhile, the water supply member may be provided at lower portion of the main body, and the guide section may include a baffle member in which one or more holes are formed, a flow guide member which allows water to be rotated and flowed into the main body, or a diaphragms member which guides water so as not to directly contact the float-feed.

Advantageous Effects of Invention

[29] According to an embodiment of the present invention, water may be flowed into a water level control apparatus without influencing upward and downward movement of the float-feed.

[30] In addition, according to an embodiment of the present invention, the float-feed may be reliably moved upwardly and downwardly depending on a water level of the water storage tank.

[31] Meanwhile, according to an embodiment of the present invention, a water level of the water storage tank may be controlled reliably.

Brief Description of Drawings

[32] The above and other aspects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[33] FIG. 1 is a perspective view of a water level control apparatus according to an embodiment of the present invention;

[34] FIG. 2 is a sectional view of a water level control apparatus provided with an opening-closing section in an upper portion thereof, according to an embodiment of the

present invention.

[35] FIG. 3 is a sectional view of a guide section of a water level control apparatus according to another embodiment of the present invention.

[36] FIG. 4 is a partial sectional view of a guide section of a water level control apparatus according to another embodiment of the present invention.

[37] FIG. 5 is a sectional view of a water level control apparatus provided with an opening-closing section in an upper portion thereof, according to another embodiment of the present invention.

[38] FIG. 6 is a sectional view of a water level control apparatus provided with an opening-closing section in a lower portion thereof, according to another embodiment of the present invention.

[39] FIGS. 7 and 8 are sectional views of operations of a water level control apparatus as shown in FIG. 2, according to an embodiment of the present invention.

Mode for the Invention

[40] Exemplary embodiments of the present invention will now be described in detail with reference to the accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like reference numerals in the drawings denote like elements, and thus their description will be omitted.

[41] A water level control apparatus 100 according to the present invention as shown in FIGS. 1-3 and 5-6 may include a main body 200, one or more float-feeds 300, an opening-closing section 400 and a guide section 500.

[42] The main body 200 may include, as in the embodiments shown in FIGS. 1-3 and 5-6, a water supply member 221 for water to be in-flowed and a coupling member 211 which is connected to a water storage tank (not shown).

[43] The water supply member 221 may be connected to an opening-closing section 400 (to later be described) which is connected to a water supply source (not shown). The water supply member 221 may be connected to the opening-closing section 400 through a connection tube (not shown). However, if the water storage tank is a water purifying tank (not shown) provided with a water purifier (not shown), the water supply member 221 may be connected to a plurality of water purifying filters (not shown) which are provided in the water purifier and connected to the opening-closing section 400, and thus the water supply member 221 may be connected indirectly to the opening-closing section 400.

[44] Through this configuration, water from the water supply source may flow into the

main body 200 through the water supply member 221, as shown in FIG. 7. Here, the water supplied to the main body 200 may be moved to the water storage tank through the connection member 211. If a water level of the water storage tank is lowered than a predetermined level, that is, a lower end of the main body 200, the water supplied to the main body 200 through the water supply member 221 may not be introduced to the main body 200 and moved to the water storage tank through the connection member 211 and stored therein. In addition, if the water level of the water storage tank is higher than the lower end of the main body 200, the main body may be filled with the water and water levels of the main body and the water storage tank may be equal to each other. Meanwhile, when water flows continuously into the main body 200 through the water supply member 221, the water levels of the main body 200 and the water storage tank ascend together to a same extent.

- [45] Meanwhile, even though not shown, a check valve may be provided on the connection member 211 to operate such that water is able to move from the main body 200 to the water storage tank through the connection member 211 however, the water is unable to move from the water storage tank to the main body 200 through the connection member 211.
- [46] Here, the water storage tank may be a water purifying tank provided in a water purifier. However, the water storage tank is not limited thereto and it may be any container which stores liquid.
- [47] The main body 200 may include a body member 210 and a cover member 220, as in the embodiments shown in FIGS. 1-3 and 5-6. The body member 210, an upper portion of which is opened, may be provided with the connection member 211. Additionally, one or more float-feeds 300 may be provided inside the body member 210 such that they are moved upwardly and downwardly, as shown in the embodiments. The cover member 220 may be connected to the body member 210 to cover the opened upper portion, as shown in the embodiments. Here, a configuration of the cover member 220 being connected to the body member 210 is not limited thereto, and any configurations may be used, through which a separation and a connection of the cover member and the body member may be easily made and further a sealing when they are connected may be made tightly. The water supply member 221 may be provided to the cover member 220, as shown in the embodiments.
- [48] As a result, the water in the water supply source may be flowed into an upper portion of the main body 200 through the opening-closing section 400 (to be described later) and the water supply member 221, and the water in the main body 200 may be moved from a lower portion of the main body 200 to the water storage tank through the connection member 211, and stored therein.
- [49] The float-feed 300, as in the embodiments shown in FIGS. 1-3 and 5-6, may be

provided inside the main body 200 such that it may be moved upwardly and downwardly. Therefore, as shown in FIGS. 7 and 8, the float-feed 300 may be moved upwardly and downwardly depending on a water level of the main body 200.

[50] One or more float-feeds 300 may be provided on the main body 200. As in the embodiments shown in FIGS. 1-3 and 5-6, when two float-feeds, that is, a plurality of float-feeds 300 are provided on the main body 200, even in the case one or more float-feeds 300, among the plurality of the float-feeds 300, fail in upward and downward movement, other float-feeds 300 may be moved upwardly and downwardly depending on the water level of the main body 200.

[51] Accordingly, even in case that one or more float-feeds 300, among the plurality of float-feeds 300, fail in upward and downward movement, the fluid path 411 which is formed in the opening-closing section 400 and connected to the water supply source and the water supply member 221 may be opened and closed through an upward and downward movement member 440 included in the opening-closing section 400 which is associated with the float-feed 300 and will be described later. Therefore, a water level control operation through the water level control apparatus 100 according to the present invention may be performed smoothly without interruption.

[52] Meanwhile, a magnet 310 may be provided in the float-feed 300, as in the embodiments shown in FIGS. 2-3 and 5-6. Here, attractive or repulsive magnetic force induced from the magnet 310 depending on upward and downward movements of the float-feed 300, which will be described later, may be applied to the upward and downward movement member 440 included in the opening-closing member 400. As a result, the upward and downward movement member 440 may be moved upward and downward to open or close the fluid path 411.

[53] As in the embodiment shown in FIGS. 2-3 and 5-6, the fluid path 411 may be formed in the opening-closing section 400, one side of which is connected to the water supply source and the other side of which is connected to the water supply member 221. That is, in the embodiment shown in the drawings, an entrance 411a of the fluid path 411 may be connected to the water supply source through a connection tube (not shown) and an exit 411b of the fluid path 411 may be connected to the water supply member 221 through a connection tube.

[54] The water supply source may not be limited to any particular types thereof, and any configuration which may supply water to the fluid path 411 of the opening-closing section 400 may be used. In addition, if the water storage tank is a water purifying tank which is provided in a water purifier, as previously mentioned, the fluid path 411 of the opening-closing section 400 may be connected to the water supply member 221 through a plurality of water purifying filters (not shown) provided in the water purifier, instead of being connected directly to the water supply member 221. However, a con-

figuration of the fluid path 411 of the opening-closing section 400 being connected to water supply member 221 may not be limited thereto.

- [55] Furthermore, the opening-closing section 400 may be provided in the upper portion of the main body 200, and when the main body 200 includes the body member 210 and the cover member 220, as in the embodiments shown in FIGS. 1-3 and 5, the opening-closing section 400 may be provided in the cover member 220. When the opening-closing section 400 is provided on the cover member 220 of the main body 200, the float-feed 300 may be easily separated from the body member 210, together with a float-feed guide member 430 included in the opening-closing section 400, as will be described later, when the cover member 220 is separated from the main body 210. Accordingly, since the body member 210 can be easily washed, a degree of sanitation of the water level control apparatus 100 may be improved and thus the degree of sanitation of the water storage tank connected to the water level control apparatus may also be improved.
- [56] Additionally, the opening-closing section 400 may be provided in the lower portion of the main body 200 as in the embodiment shown in FIG 6, and when the main body 200 includes the body member 210 and the cover member 220 as previously mentioned and shown in the embodiments, the opening-closing section 400 may be provided in the lower portion of the body member 210.
- [57] The opening-closing section 400 may be associated with one or more float-feeds 300 which are provided to be movable upwardly and downwardly in the main body 200, as in the embodiments shown in FIGS. 2-3 and 5-6. The fluid path 411 may be configured to be opened and closed depending on a water level of the water storage tank, that is, a water level of the main body 200 depending on the water level of the water storage tank, as shown in FIGS. 7 and 8. As a result, the water level of the water storage tank may be controlled through an opening and closing of the fluid path.
- [58] That is, when the water level of the water storage tank is not full, the float-feed 300 may not be moved in the main body 200, or even if it is moved upwardly, the fluid path 411 of the opening-closing section 400 remains open, as shown in FIG. 7. As a result, water in the water supply source flows into the main body 200 through the fluid path 411 and moves into the water storage tank through the connection member 211 and is stored therein.
- [59] Furthermore, when the water level of the water storage tank is full, the float-feed 300 is moved upwardly to the highest position in the main body 200 to close the fluid path 411 of the opening-closing section 400. As a result, water supply from the water supply source to the water storage tank is interrupted.
- [60] The opening-closing section 400 may include, as in the embodiments shown in FIGS. 2-3 and 5-6, an opening-closing section body 410, a sealing member 420, a float-feed

guide member 430 and an upward and downward movement member 440.

- [61] As in the embodiments shown in FIGS. 2-3 and 5-6, the fluid path 411 may be formed in the opening-closing section body 410. Additionally, a connection hole 412 may be formed in the opening-closing section body 410 connected to the fluid path 411. Here, a chamber 413 may be formed to be connected to the connection hole 412 and the main body 200.
- [62] When the opening-closing section 400 is formed in an upper portion of the main body 200, as in the embodiments shown in FIGS. 2-3 and 5, the chamber 413 may be connected to an upper portion of the main body 200. In addition, when the opening-closing section 400 is provided in a lower portion of the main body 200, as in the embodiment shown in FIG. 6, the chamber 413 may be connected to a lower portion of the main body 200.
- [63] Meanwhile, the connection hole 412 and the chamber 413 formed in the opening-closing section body 410 may be formed in the opening-closing section body 410, as a single unit, respectively, when only one float-feed 300 is provided in the main body 200. However, when more than two float-feeds 300, that is, a plurality of float-feeds are provided in the main body 200, as in the embodiments shown in FIGS. 2 and 5-6, the connection hole 412 and the chamber 413 may be formed as a plurality, corresponding to the number of the float-feeds 300.
- [64] Additionally, as in the embodiment shown in FIG. 3, when the float-feeds 300 may be provided in the main body 200 as a plurality, a plurality of the opening-closing section bodies 410 in each of which the connection hole 412 and the chamber 413 are provided singularly, respectively, may be provided in the main body 200, which are associated with the plurality of the float-feeds 300, respectively. Here, the fluid paths 411 of the respective opening-closing section body 410 may be connected to each other through the connection tube 414.
- [65] The sealing member 420 may be provided in the chamber 413 to seal the connection hole 412, as in the embodiments shown in FIGS. 2-3 and 5-6. In addition, a communicating hole 421 connected to the fluid path 411 and a opening-closing hole 422 may be formed in the sealing member 420. As a result, as shown in FIG. 7, when the opening-closing hole 422 is not closed by the upward and downward movement member 440 which is included in the opening-closing section 400 and will be described later, the water flowed into the fluid path 411 from the water supply source through the entrance 411a may be flowed into the chamber 413 through the communicating hole 421 and then flowed back into the fluid path 411 through the opening-closing hole 422 and discharged through the exit 411b. Meanwhile, a sealing assistant member 423 may be provided in the sealing member 420 to aid for sealing the connectionhole 421, as shown in the embodiment. Here, a communicating hole 421' may be

formed in the sealing assistant member 423, as shown in the embodiment.

- [66] As in the embodiments shown in FIGS. 2-3 and 5-6, one side of the float-feed guide member 430 may be arranged in the main body 200 to be connected to the chamber 413 of the opening-closing section body 410. When the opening-closing section 400 is provided in an upper portion of the main body 200, as in the embodiments shown in FIGS. 2-3 and 5, one side of the float-feed guide member 430 may be arranged in an upper portion of the main body 200, as in the embodiments. Meanwhile, when the opening-closing section 400 is provided in a lower portion of the main body 200, as in the embodiment shown in FIG. 6, one side of the float-feed guide member 430 may be arranged in a lower portion of the main body 200.
- [67] Additionally, the other side of the float-feed guide member 430 may penetrate into the float-feed 300, as in the embodiments shown in FIGS. 2-3 and 5. When the other side of the float-feed guide member 430 penetrates into the float-feed 300, a stop member 431 may be provided on the other side of the float-feed guide member 430, as in the embodiments. As a result, even when the float-feed 300 is moved downward, the float-feed 300 may not be separated from the float-feed guide member 430, and thus, when the cover member 220 and the body member 210 included in the main body 200 are separated from each other, the float-feed 300, together with the float-feed guide member 430, may be pulled from the body member 210. In addition, when the stop member 431 is removed, the float-feed 300 may be separated from the float-feed guide member 430. As a result, the float-feed 300 may be separably connected to the float-feed guide member 430.
- [68] Meanwhile, as in the embodiment shown in FIG. 6, the other side of the float-feed guide member 430 may be connected for the float-feed 300 to be movable upwardly and downwardly. That is, as in the embodiments, a hole may be formed in the float-feed 300 and the other side of the float-feed guide member 430 may be inserted into the hole and the other side of the float-feed guide member 430 may be connected for the float-feed 300 to be movable upwardly and downwardly. Through this configuration, as in the embodiments shown in FIGS. 2-3 and 5, the float-feed 300 may be separably connected to the float-feed guide member 430 without the stop member 431. That is, in the embodiment shown in FIG. 6, when the float-feed 300 may be moved upwardly by a predetermined distance, the float-feed 300 may be separated from the float-feed guide member 430.
- [69] As shown in FIGS. 7 and 8, upward and downward movement of the float-feed 300 may be guided by the float-feed guide member 430.
- [70] The upward and downward movement member 440 may be provided inside the float-feed guide member 430 to be movable upwardly and downwardly, as in the embodiments shown in FIGS. 2-3 and 5-6. In addition, the upward and downward

movement member 440 may be moved upward and downward through magnetic force of the magnet 310 provided in the float-feed 300 moving upwardly and downwardly. As a result, the opening-closing hole 422 of the sealing member 420 may be opened and closed, as shown in FIGS. 7 and 8.

- [71] Since the opening-closing hole 422 of the sealing member 420 is opened and closed by the upward and downward movement member 440, and further, the upward and downward movement member 440 made of a metal or a magnetic material, or provided with a plurality of magnets is arranged inside the float-feed guide member 430, the water introduced in the main body 200 may not directly contact the upward and downward movement member 440. Therefore, a degree of sanitation of the water level control apparatus 100 may be improved, and accordingly a degree of sanitation of the water storage tank connected to the water level control apparatus 100 may be improved.
- [72] The upward and downward movement member 440 may be made of a metal such as iron, etc., as in the embodiments shown in FIGS. 2-3 and 6.
- [73] As in the embodiments shown in FIGS. 2 and 3, when the opening-closing section 400 is provided in an upper portion of the main body 200 and a water level of the water storage tank is lowered, the water level of the main body 200 is lowered and the float-feed 300 is moved downwardly or kept in a state of downward movement as shown in Fig. 7. Here, the upward and downward movement member 440 is moved downwardly or kept in a state of downward movement, together with the float-feed 300, by attractive magnetic force induced from the magnet 310 provided in the float-feed 300.
- [74] As a result, the opening and closing hole 422 of the sealing member 420 is opened and thus water in the water supply source flows through the fluid path 411 and flows into the main body 200 through the water supply member 221, and the water introduced into the main body 200 is moved into the water storage tank through the connection member 211 and stored therein.
- [75] Additionally, when a water level of the water storage tank is raised through water supply to the water storage tank, the water level of the main body 200 is raised for the float-feed 300 to be moved upwardly. Here, the upward and downward movement member 440 is also raised through attractive magnetic force induced from the magnet 310 provided in the float-feed 300.
- [76] Meanwhile, when water level of the water storage tank is to be full, as shown in FIG. 8, the float-feed 300 is to be moved upwardly to the highest position and, as a result, the upward and downward movement member 440 closes the opening and closing hole 422 of the sealing member 420.
- [77] Accordingly, the fluid path 411 is to be closed to interrupt water supply from the water supply source to the water storage tank.

- [78] Meanwhile, as shown in the embodiment shown in FIG. 6, when the opening-closing section 400 is provided in a lower portion of the main body 200, and the water levels of the water storage tank and the main body 200 are lowered and the float-feed 300 is moved downwardly or in a state of downward movement, the upward and downward movement member 440 is to be moved upward or in a state of upward movement through attractive magnetic force induced from the magnet 310 of the float-feed 300.
- [79] Therefore, the opening and closing hole 422 of the sealing member 420 is opened and the water in the water supply source flows through the fluid path 411 and flows into the main body 200 through the water supply member 221, and the water introduced into the main body 200 is moved to the water storage tank through the connection member 211 and stored therein.
- [80] In addition, when the water level of the water storage tank is raised through water supply, together with a water level of the main body 200, for the float-feed 300 to be moved upwardly, the upward and downward movement member 440 is also kept in a state of upward movement through attractive magnetic force induced from the magnet 310 provided in the float-feed 300.
- [81] Meanwhile, when the water level of the water storage tank is full, the float-feed 300 may be raised to the highest position in the main body 200 and in this location the magnetic force induced from the magnet 310 provided in the float-feed 300 does not influence the upward and downward movement member 440. Therefore, the upward and downward movement member 440 may be moved downwardly through self-weight to close the opening and closing hole 422 of the sealing member 420.
- [82] As a result, the fluid path 411 is to be closed to interrupt water supply from the water supply source to the water storage tank.
- [83] Meanwhile, as in the embodiment shown in FIG. 5, the upward and downward movement member 440 may be made of a magnet on which a plurality of steps 441 are formed. When the upward and downward movement member 440 is made of a magnet on which a plurality of steps 441 are formed, magnetic lines of force are produced for each step 441 to have a role of a single magnet. Therefore, it may have effects as if a plurality of magnets are arranged on the upward and downward movement member 440 at a predetermined spaced-distance.
- [84] Additionally, although not shown in the drawings, a plurality of magnets may be provided in the upward and downward movement member 440 in a predetermined spaced-distance.
- [85] When the upward and downward movement member 440 is configured as previously mentioned, repulsive force may apply to the upward and downward movement member 440, which is produced from co-operation between magnetic force induced from the magnet 310 provided in the float-feed 300 and magnetic force induced from

some steps 441, which are located near to the magnet 310 of the float-feed 300, among a plurality of steps 441 of the upward and downward movement member 440 made of magnet, or some of magnets, which are located near to the magnet 310 of the float-feed 300, among a plurality of magnets provided in the upward and downward movement member 440.

- [86] In addition, even when magnetic force induced from some steps 441 among a plurality of steps 441 or induced from some magnets among a plurality of magnets disappears, the repulsive force may apply to the upward and downward movement member 440, which is produced from co-operation between magnetic force induced from other steps 411 or other magnets and magnetic force induced from the magnet 310 provided in the float-feed 300.
- [87] Therefore, the upward and downward movement member 440 may be reliably and easily moved upwardly and downwardly depending on an upward and downward movement of the float-feed 300.
- [88] In this case, the water levels of the water storage tank and the main body 200 are lowered and thus the float-feed 300 is moved downward or in a state of downward movement, the repulsive force may not apply to the upward and downward movement member 440.
- [89] Therefore, the upward and downward movement member 440 may be moved downward or in a state of downward movement through self-weight. Furthermore, the opening and closing hole 422 of the sealing member 420 is opened and water in the water supply source flows through the fluid path 411 and flows into the main body 200, and the water introduced into the main body 200 is moved into the water storage tank through the connection member 211 and stored therein.
- [90] Additionally, when the water levels of the water storage tank and the main body 200 are raised through a water supply to the water storage tank and the float-feed 300 is moved upwardly, the upward and downward movement member 440 also is raised through the repulsive force.
- [91] When the water level of the water storage tank is full, the float-feed 300 is raised to the highest position in the main body 200 and as a result, the upward and downward movement member 440 closes the opening and closing hole 422 of the sealing member 420.
- [92] Accordingly, the fluid path 411 is closed to interrupt water supply from the water supply source to the water storage tank.
- [93] Meanwhile, the opening-closing section 400 may include an elastic member 450, as in the embodiments shown in FIGS. 2-3 and 5-6. The elastic member 450 may be provided inside the float-feed guide member 430 to elastically support the upward and downward movement member 440, as in the embodiments show in drawings.

- [94] Therefore, in the embodiments shown in FIGS. 2 and 3 when the upward and downward movement member 440 is raised through an upward movement of the float-feed 300, elastic force from the elastic member 450, in addition to magnetic force induced from the magnet 310 provided in the float-feed 300, may apply to the upward and downward movement member 440.
- [95] Furthermore, in the embodiment shown in FIG. 6 when the float-feed 300 is raised to the highest position and the upward and downward movement member 440 is lowered, the elastic force from the elastic member 450 may apply to the upward and downward movement member 440.
- [96] In addition, in the embodiment shown in FIG. 5 when the float-feed 300 is moved downward and the upward and downward movement member 440 is moved downward through self-weight, without the repulsive force being applied to the upward and downward movement member 440, the elastic member 450 may buffer the downward movement of the upward and downward movement member 440. Therefore, noise produced from a downward movement of the upward and downward movement member 440 can be avoided.
- [97] A guide section 500, as in the embodiments shown in FIGS. 1-6, may be provided inside the main body 200 adjacent to the water supply member 221. The guide section 500 may guide water to be flowed into the main body 200, without influencing upward and downward movement of the float-feed 300. Therefore, the float-feed 300 may be reliably moved upwardly and downwardly depending on the water level of the water storage tank, and as a result, a water level of the water storage tank is reliably controlled by the water level control apparatus 100.
- [98] The guide section 500, as in the embodiments shown in FIGS. 2 and 5-6, may include a partition 510 in a lower portion of which one and more passage holes 511 through which water passes are formed. Therefore, the water introduced into the main body 200 through the water supply member 221 flows to a lower portion of the main body 200 along the partition 510 and then passes through the passage hole 511 of the partition 510, and starts to fill the lower portion of the main body 200.
- [99] Meanwhile, the partition 510, as in the embodiments shown in FIGS. 2 and 5-6, may be spaced at a predetermined distance from the lower portion of the main body 200, in addition to the passage hole 511 through which water passes being formed.
- [100] Additionally, when the float-feed 300 may be provided inside the main body 200 as a plurality, as in the embodiment shown in FIG. 3, the water supply member 221 may be provided in an upper portion of the main body 200 between the float-feeds 300. Furthermore, the guide section 500 may include a partition 510' provided inside the main body 200 between the float-feeds 300. A section of the partition 510' is shaped to guide the water introduced through the water supply member 221 to be flowed to a

lower portion of the main body 200. For this purpose the section of the partition 510', as in the embodiment shown in FIG. 3, may have a "└" shape. However, the section of the partition 510' is not limited thereto, and any shapes such as an "11" character, etc., which guide the water introduced through the water supply member 221 to be flowed to a lower portion of the main body 200, may be used. Further, one or more passage holes 511' through which water passes may be formed in a lower portion of the partition 510.

[101] Accordingly, the water introduced into the main body 200 through the water supply member 221 flows to a lower portion of the main body 200 along the partition 510' and then passes through the passage hole 511' of the partition 510', and starts to fill the lower portion of the main body 200.

[102] Meanwhile, as in the embodiment shown in FIG. 3, when the float-feed 300 may be provided as a plurality and the water supply member 221 may be provided in an upper portion of the main body 200 between the float-feeds 300, the guide section 500 may be provided inside the main body 200 between the float-feeds 300, and at lower portion of which a passage hole 511 through which water passes may be formed, or include a plurality of partitions 510 which are spaced at a predetermined distance from a lower portion of the main body 200.

[103] The partitions 510 and 510' may be provided inside the main body 200 through being fitted into a guide rib 212 formed in the body member 210 if the main body 200 includes the body member 210 and the cover member 220, as in the embodiments shown in FIGS. 2-3 and 5-6. However, a configuration of the partitions 510 and 510' being provided inside the main body 200 is not limited to the embodiments shown in the drawings, and any configurations in which the partitions 510 and 510' are connected to the cover member 220 and are provided inside the main body 200, may be used.

[104] Meanwhile, as in the embodiments shown in FIGS. 4(a) and 4(b), the guide section 500 may include a guide member 520. One side of the guide member 520 may be connected to the water supply member 221, as in the embodiment shown in drawings. The other side of the guide member 520 may be placed inside the main body 200 and under a center of the main body 200.

[105] A section of the guide member 520 may be shaped of a semi-circle, as in the embodiment shown in FIG. 4(a), or of a tube, as in the embodiment shown in FIG. 4(b). However, the shape of the guide member 520 is not limited to a special form, and any shapes which allow water to be flowed into the main body 200 without influencing upward and downward movements of the float-feed 300, may be used.

[106] The guide member 520 may be used instead of that the partition 510' into which the passage hole 511 is formed, and a section of which has a "└" shape and the passage

hole 511 is formed or a plurality of partitions 510 is placed in a predetermined distance from a lower portion of the main body 200, even when the float-feed 300 is provided as a plurality and the water supply member 221 is provided at an upper portion of the main body between the float-feeds 300, as in the embodiments shown in FIG. 3.

[107] Meanwhile, the partitions 510 and 510' or the guide member 520 may be included in the guide section 500 singularly or in plural, as in the embodiments shown in FIGS. 2-6.

[108] Additionally, the water supply member 221 may be provided in a lower portion of the main body 200, differently from the embodiments shown in FIGS. 1-8. Therefore, water may be flowed into a lower portion of the main body 200. In this case, the guide section 500 may include, although not shown in drawings, a baffle member in which one or more holes are formed, a flow guide member which allows water to be rotated and flowed into the main body 200, or a diaphragms member which guides water so as not to directly contact the float-feed 300 when water is introduced. Through this configuration water is not weighted on a part of the main body 200 and flowed evenly into the main body 200. As a result, water is evenly moved upwardly in the main body 200 and thus the float-feed 300 may be reliably moved upwardly and downwardly depending on water level of the water storage tank and further water level of the water storage tank is reliably controlled by the water level control apparatus 100.

[109] When the water level control apparatus according to the present invention is used, water may be introduced into the water level control apparatus, without influencing upward and downward movement of the float-feed and the float-feed is reliably moved upwardly and downwardly, and the water level of the water storage tank is controlled reliably.

[110] While the present invention has been shown and described in connection with the exemplary embodiments, it will be apparent to those skilled in the art that modifications and variations can be made without departing from the spirit and scope of the invention as defined by the appended claims.

[111]

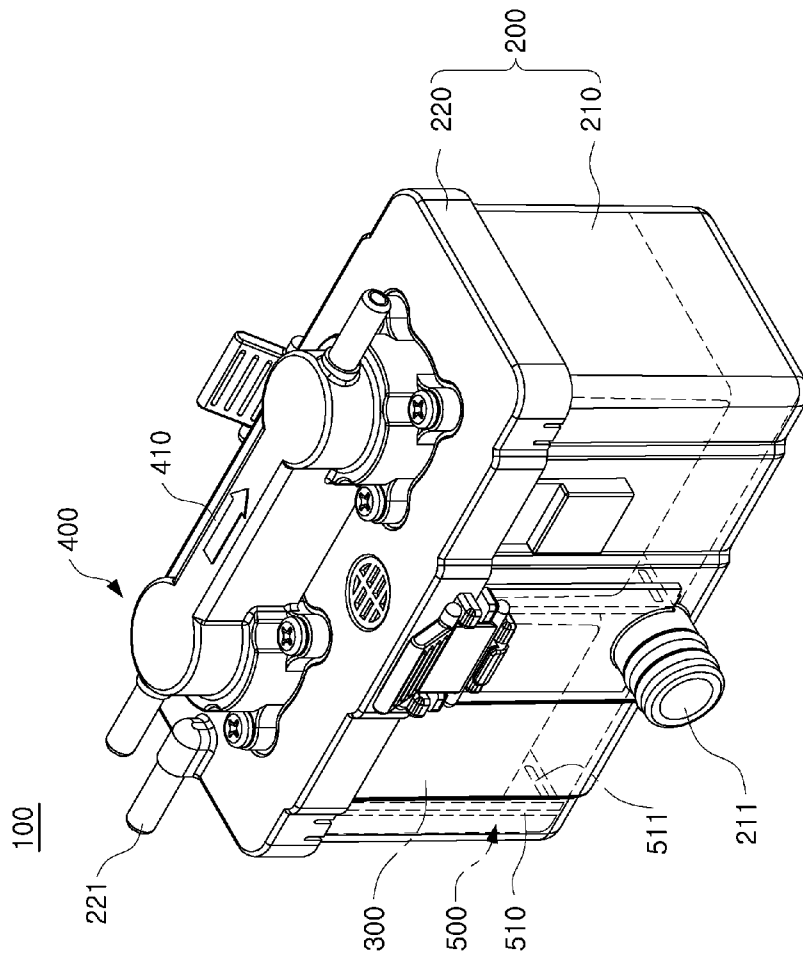
Claims

- [Claim 1] A water level control apparatus, comprising:
a main body provided with a water supply member through which water flows into and a connection member connected to a water storage tank;
one or more float-feeds which are provided inside the main body and movable upwardly and downwardly depending on a water level of the main body
an opening-closing section in which a fluid path, one side of which is connected to a water supply source and the other side of which is connected the water supply member, is formed, and which is provided in the main body to be associated with the one or more float-feeds and opens and closes the fluid path depending on a water level of the water storage tank; and
a guide section which is provided inside the main body adjacent to the water supply member and guides water to be introduced without influencing upward and downward movements of the float-feed.
- [Claim 2] The apparatus of claim 1, wherein the main body comprises:
a body member, an upper portion of which is opened and in which the connection member is provided and the one or more float-feeds are provided to be movable upwardly and downwardly, and
a cover member which is connected to the body member to cover the opened upper portion of the body member and in which the water supply member is provided.
- [Claim 3] The apparatus of claim 1, wherein the guide section on a lower portion of which one or more passage holes through which water passes are formed, and which comprises one or more partition placed at a predetermined distance from a lower portion of the main body.
- [Claim 4] The apparatus of claim 1, wherein one or more float-feeds are provided inside the main body,
the water supply member is provided in an upper portion of the main body between the float-feeds, and
the guide section includes a partition which is provided inside the main body between the float-feeds, a section of which is shaped to guide water introduced into the main body through the water supply member to be flowed to a lower portion of the main body, and in which one or more passage holes through which water passes are formed.

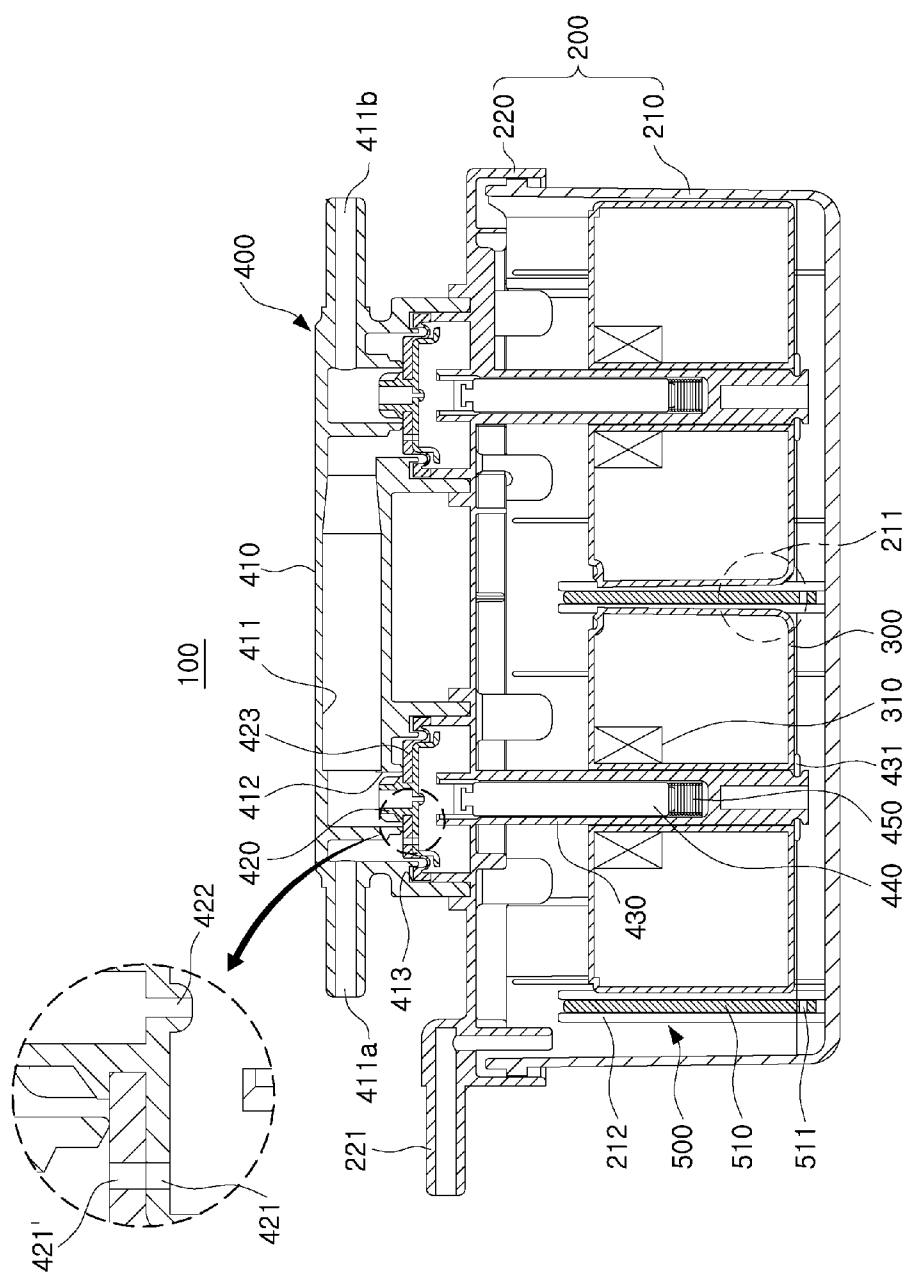
- [Claim 5] The apparatus of claim 1, wherein a section of the partition has a " ┘ " shape.
- [Claim 6] The apparatus of claim 1, wherein the guide section comprises a guide member, one side of which is connected to the water supply member and the other side of which is placed inside the main body and under a center of the main body.
- [Claim 7] The apparatus of claim 1, wherein the opening-closing section comprises:
an opening-closing section body in which the fluid path, a connection hole connected to the fluid path, and a chamber which is connected to an upper portion or a lower portion of the main body, are formed;
a sealing member which is provided in the chamber to seal the connection hole, and in which a communicating hole communicated to the fluid path and an opening and closing hole communicated to the connection hole are formed
a float-feed guide member, one side of which is arranged on an upper portion or a lower portion of the main body to be connected to the chamber and the other side of which penetrates into the float-feed provided with a magnet, or to which the float-feed is connected to be movably upwardly and downwardly and
an upward and downward movement member which is provided movably upwardly and downwardly inside the float-feed guide member and is moved upward and downward through magnetic force induced from the magnet depending on upward and downward movements of the float-feed to open and close the opening and closing hole.
- [Claim 8] The apparatus of claim 7, wherein the opening-closing section further comprises an elastic member which is provided inside the float-feed guide member, to elastically support the upward and downward movement member.
- [Claim 9] The apparatus of claim 7, wherein the upward and downward movement member is made of a magnet on which a plurality of steps are formed, or is provided with a plurality of magnets which are spaced at a predetermined distance.
- [Claim 10] The apparatus of claim 7, wherein the float-feed is separably connected to the float-feed guide member.
- [Claim 11] The apparatus of claim 1, wherein the water supply member is provided at lower portion of the main body, and the guide section comprises a baffle member in which one or more holes are formed, a flow guide

member which allows water to be rotated and flowed into the main body, or a diaphragms member which guides water so as not to directly contact the float-feed.

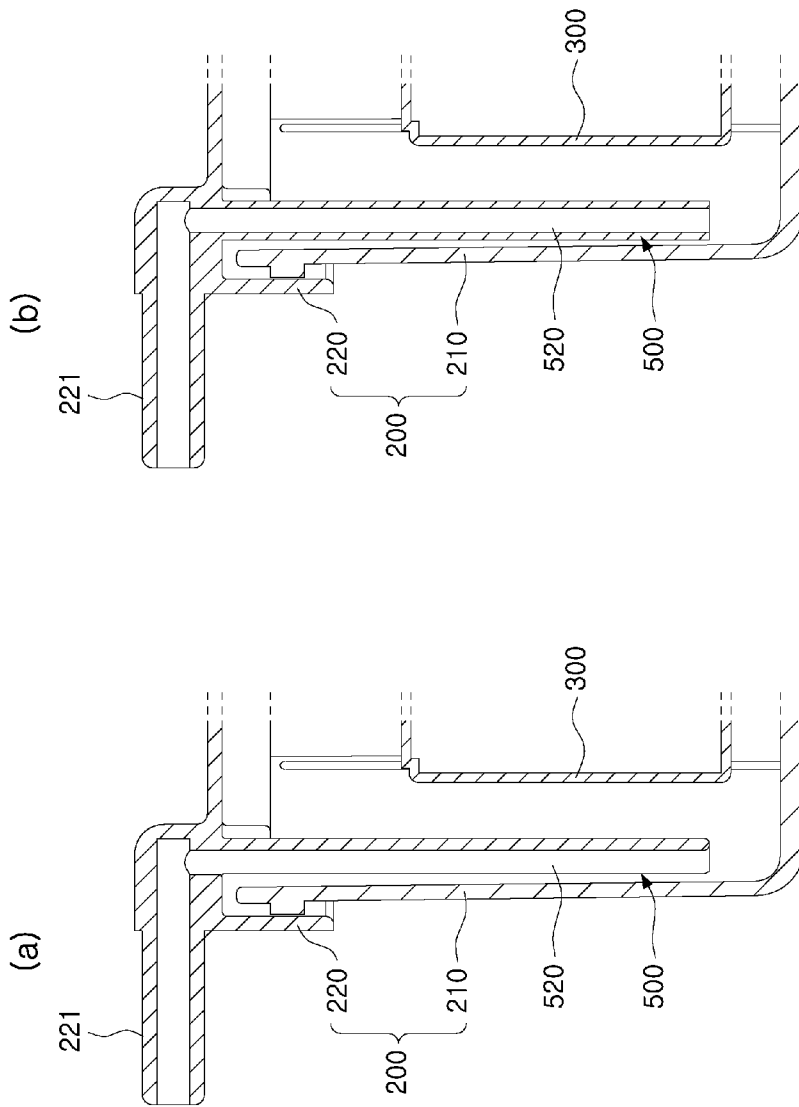
[Fig. 1]



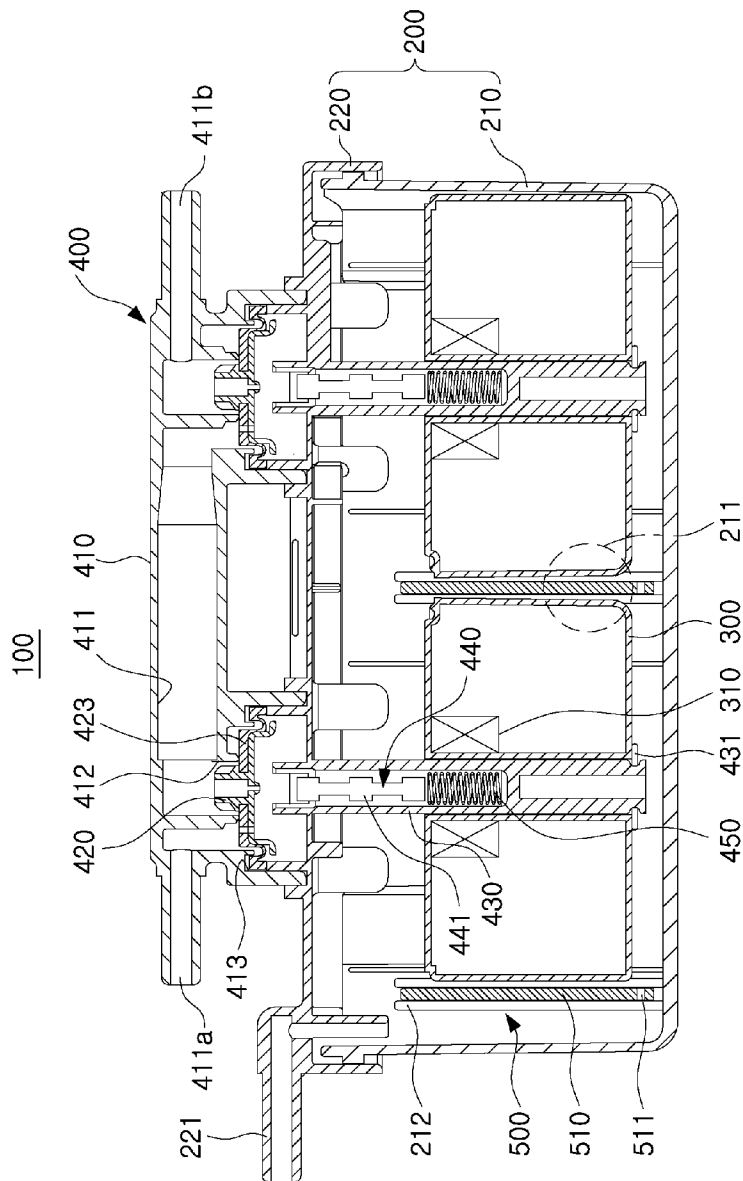
[Fig. 2]



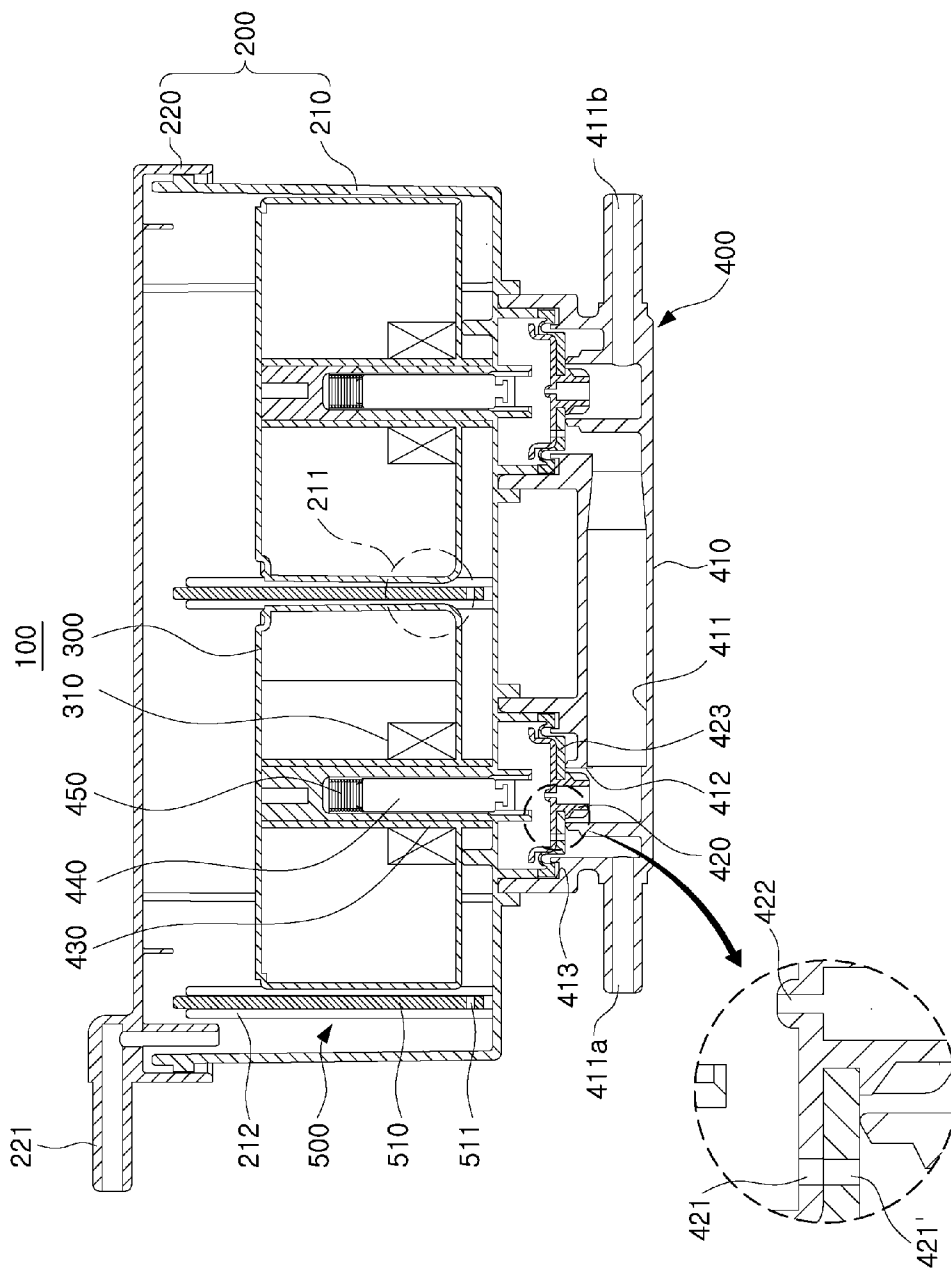
[Fig. 4]



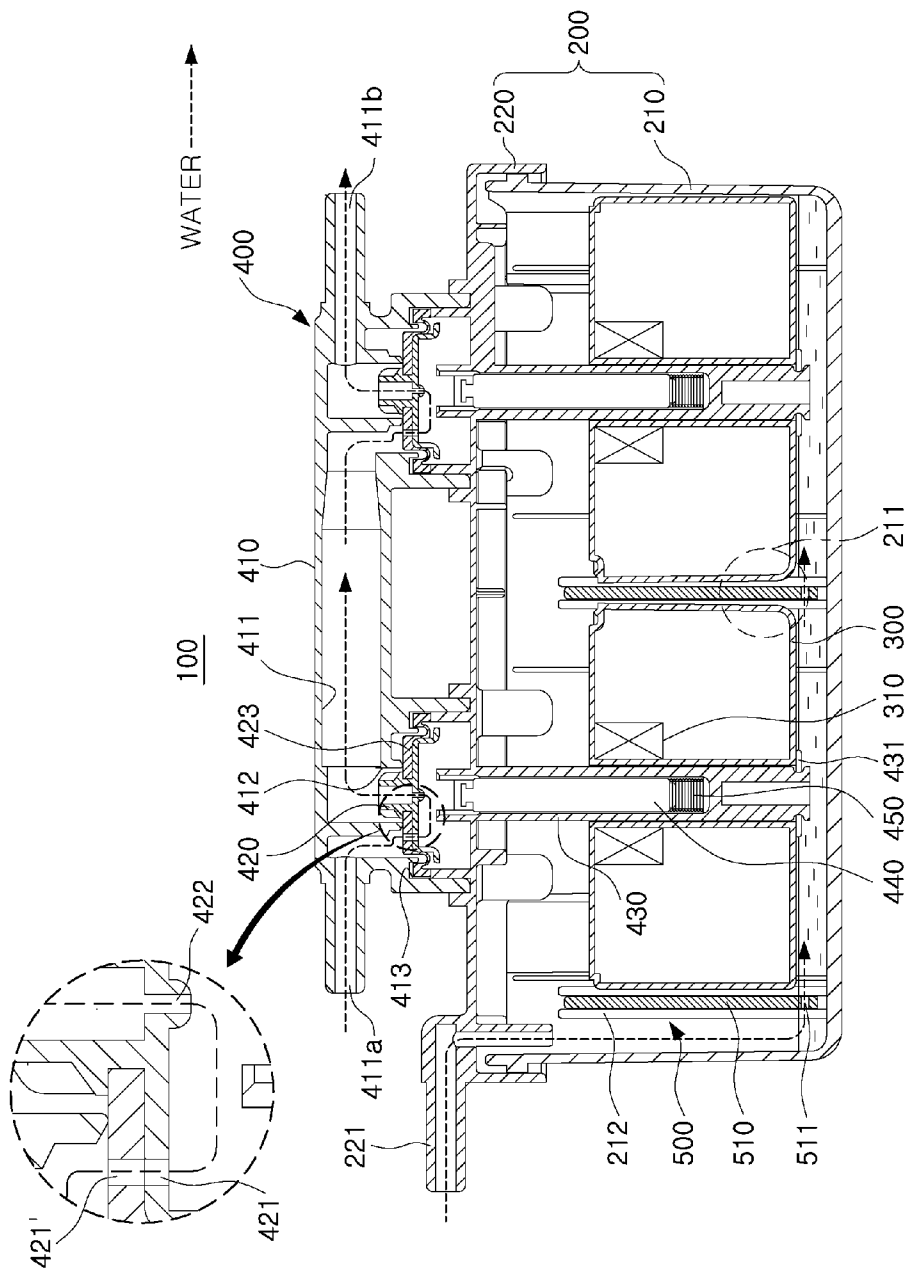
[Fig. 5]



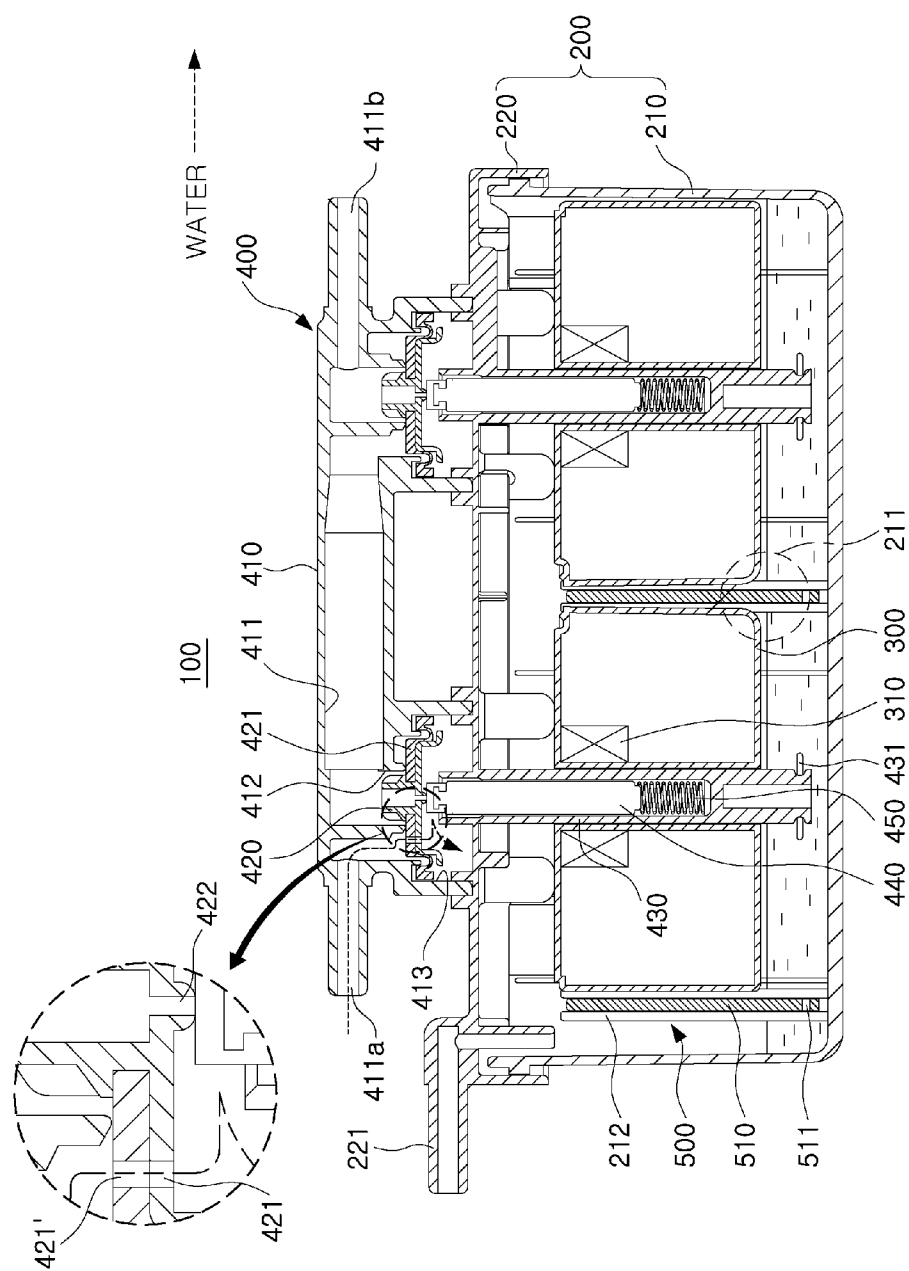
[Fig. 6]



[Fig. 7]



[Fig. 8]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2011/004809**A. CLASSIFICATION OF SUBJECT MATTER*****B65D 90/26(2006.01)i, E03B 11/00(2006.01)i, G05D 9/00(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D 90/26; B08B 9/04; B01D 35/00; F16K 31/18; B01D 35/14; F16K 31/34

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

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:tank,reservoir, valve,guide,float

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 20-2000-0000234 U (WOONGJIN COWAY CO., LTD.) 15 January 2000 See page 3, lines 1-52 and figures 1-5.	1-11
A	KR 10-2010-0082435 A (Lee Seong Ju) 19 July 2010 See paragraph 33 - paragraph 46 and figures 3a-5c.	1-11
A	US 6332475 B1 (BROUGHAM; PETER HENRY) 25 December 2001 See column 3, line 25 - 55 and figure 1.	1-11

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15 MARCH 2012 (15.03.2012)

Date of mailing of the international search report

19 MARCH 2012 (19.03.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsu-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KANG, Jung Seok

Telephone No. 82-42-481-5410



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2011/004809

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 20-2000-0000234 U	15.01.2000	None	
KR 10-2010-0082435 A	19.07.2010	None	
US 6332475 B1	25.12.2001	AT 308002 T	15.11.2005
		AU 1998-59761 B2	02.11.2000
		AU P052-499700	20.03.1997
		CA 2282024 A1	27.08.1998
		CA 2282024 C	17.10.2006
		CN 1103890 C	26.03.2003
		CN 1248317 A	22.03.2000
		DE 69832042 D1	01.12.2005
		DE 69832042 T2	13.07.2006
		EP 0960295 A1	01.12.1999
		EP 0960295 A4	15.05.2002
		EP 0960295 B1	26.10.2005
		JP 04-392484 B2	23.10.2009
		JP 2001-526759 A	18.12.2001
		NZ337330A	26.01.2001
		WO 98-37348 A1	27.08.1998