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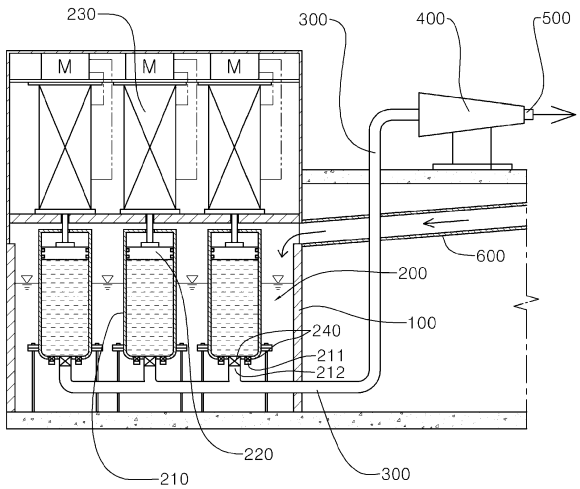
(54) WATER TRANSFER APPARATUS CAPABLE OF HIGH-PRESSURE DISCHARGE

(57) The present invention relates to a water transfer apparatus capable of high-pressure discharge, which allows for effectively transferring water to high-rise buildings or remote places which are difficult to supply water, or factories requiring a large amount of water, etc. by discharging water from a water tank at high pressure by means of a plurality of pressurized exhaust apparatuses. That is, the present invention comprises: a water tank in which water is stored; a plurality of pressurized exhaust apparatuses installed inside the water tank; a plurality of exhaust pipes connected to the outlets of the pressurized exhaust apparatuses; a water collection part, connected to the plurality of exhaust pipes, in which joined water is collected at high pressure and which has a shape tapering toward a discharge direction; and a discharge part, installed at the tapered end of the water collection part, through which high-pressure water is discharged, wherein the pressurized exhaust apparatuses comprise: storage parts in which the water in the water tank is held through an inlet port; pressurizing members which exhaust the water in the storage parts toward the outlets; and hydraulic operation parts configured to elevate the pressurizing members.

[Fig. 1]



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Description

[Technical Field]

[0001] The present invention relates to a water transfer apparatus capable of high-pressure discharge, and particularly, to a water transfer apparatus capable of high-pressure discharge, which enables water in a water tub to be effectively transferred to high-rise buildings or remote places that are difficult to supply water or factories requiring a large amount of water by discharging water at high pressure by using multiple pressure discharge devices.

[Background Art]

[0002] In general, all liquids including water are transferred by means of a pump, a method of transferring water by using the pump is widely used, and a capacity of the pump is adjusted in accordance with the amount of water to be transferred.

[0003] However, the pump in the related art uses a method of transferring water by rotating an impeller by operating a motor. That is, multiple high-capacity pumps are used to transfer a large amount of water to the places where the water is used, but there is a problem in that the amount of water to be supplied is limited in respect to a size of the pump and the water supply is inefficient with respect to installation costs. There is also a problem in that water pressure is insufficient to transfer the water to remote places, and thus it is necessary to install and connect multiple pumps at predetermined intervals on a route through the water is transferred in order to transfer the water.

[0004] In addition, in the case of the method using the pump in the related art, pressure may put stress on the impeller and the motor when transferring the water at high pressure through a pipe or discharge port which is gradually narrowed, and as a result, there is a problem in that a breakdown may occur or transfer efficiency with respect to electric power consumption deteriorates because the impeller cannot be smoothly rotated as water pressure is increased.

[0005] As a related art, Korean Patent No. 1439362 (Integrated Underwater Pressure Pump Apparatus) discloses that an integrated underwater pressure pump apparatus includes a control box, a hermetic pressure pipe, an entrance, an inlet port pipe, a first connecting pipe, a pressure pipe, a second connecting pipe, a first discharge pipe, a water discharge pump, and a second discharge pipe, and the pressure pipe is provided with an underwater motor pump to transfer a fluid.

[0006] The related art discloses the apparatus for discharging the fluid in a hermetic space such as a manhole, and the water discharge principle uses an underwater motor pump, and as a result, the related art just uses a typical method using a rotating impeller. For this reason, there is a problem in that pressure for transferring the fluid and the amount of fluid to be transferred are limited, and the apparatuses need to be installed at predetermined intervals in order to transfer the fluid to remote places.

[0007] As another related art, Korean Utility Model Registration No. 467740 (Underwater Inline Pressure Pump for Pressurizing Water) discloses a technology that includes a first casing in which an impeller is installed, a second casing in which a cooling device and a drive unit are installed, and a third casing which is connected to the second casing, thereby improving cooling efficiency. However, the related art also uses the pump with the impeller, and as a result, the amount of water to be supplied or supply pressure is inevitably limited when supplying the water.

[Disclosure]

[Technical Problem]

[0008] The present invention has been made in an effort to solve the aforementioned problems, and an object of the present invention is to supply a large amount of water to places requiring water by installing multiple pressure discharge devices in a water tub, allowing a water collecting unit to collect water discharged from the multiple pressure discharge devices, and discharging the water at high pressure, thereby effectively transferring the water to remote places as the water may be discharged at high pressure.

[0009] In addition, another object of the present invention is to provide a water supply apparatus which introduces water from a water tub and discharges the water through multiple pressure discharge devices by moving pressurizing members upward and downward, thereby preventing stress from being put on the apparatus even though the water is transferred at high pressure and increasing transfer efficiency with respect to electric power consumption.

[Technical Solution]

[0010] The present invention provides a water transfer apparatus capable of high-pressure discharge, the water transfer apparatus including: a water tub which stores water; multiple pressure discharge devices which are installed in the water tub, in which each of the pressure discharge devices includes a storage unit which accommodates the water introduced from the water tub through an inlet port, a pressurizing member which discharges the water accommodated in the storage unit in a direction toward a discharge port, and a hydraulic operating unit which moves the pressurizing member upward and downward; multiple discharge pipes which are connected to the discharge ports of the pressure discharge devices; a water collecting unit which is connected to the multiple discharge pipes to collect the merged water at high pressure and has a shape that is gradually narrowed

in a discharge direction; and a discharge unit which is installed at a narrowed end portion of the water collecting unit and discharges high-pressure water.

[0011] In addition, check valves may be provided so that the discharge port is closed when the inlet port of the storage unit is opened, and the discharge port is opened when the inlet port is closed.

[0012] In addition, the pressure discharge devices may be configured as a single set in which the multiple pressure discharge devices are connected to the single discharge pipe, and the sets of the pressure discharge devices may be provided in parallel such that the pressure discharge devices are installed to be arranged in front, rear, left, and right directions.

[0013] In addition, the multiple pressure discharge devices included in the single set may sequentially perform pressurization operations to continuously discharge the water in the storage units to the discharge pipe.

[0014] In addition, the number of multiple pressure discharge devices included in the single set may be at least three.

[0015] In addition, the water transfer apparatus may further include a recovery flow path which is connected to the water tub and allows the water to be introduced into the water tub from the outside.

[Advantageous Effects]

[0016] According to the present invention, the multiple pressure discharge devices are installed in the water tub, and the water collecting unit collects and discharges the water discharged from the multiple pressure discharge devices at high pressure, and as a result, water is easily supplied to factories and the like where a large amount of water is required.

[0017] In addition, the water may be discharged at high pressure, and as a result, the water may be effectively transferred to high-rise buildings or remoted places without additional equipment.

[0018] In addition, the process of introducing the water in the water tub and the process of discharging the water are performed by moving the pressurizing members upward and downward through the multiple pressure discharge devices instead of using a method using a rotating impeller in the related art, and as a result, it is possible to prevent stress from being put on the apparatus even though the water is transferred at high pressure, and it is possible to improve transfer efficiency with respect to electric power consumption.

[Description of Drawings]

[0019]

FIG. 1 is a view illustrating an entire configuration of the present invention.

FIG. 2 is a top plan view illustrating an example in which multiple pressure discharge devices of the present invention are installed.

FIGS. 3 to 4 are views illustrating a process in which the multiple pressure discharge devices of the present invention, which are configured as a set S, sequentially perform pressurization operations, respectively.

[Modes of the Invention]

[0020] Hereinafter, an exemplary embodiment of the present invention will be described in detail with reference to the accompanying drawings. In the description of the present invention, the specific descriptions of publicly known related functions or configurations will be omitted when it is determined that the specific descriptions may unnecessarily obscure the subject matter of the present invention.

[0021] As illustrated in FIGS. 1 to 2, a water transfer apparatus capable of high-pressure discharge of the present invention includes a water tub 100 which stores water, multiple pressure discharge devices 200 which are installed in the water tub 100, multiple discharge pipes 300 which are connected to discharge ports 212 of the pressure discharge devices 200, a water collecting unit 400 which is connected to the multiple discharge pipes 300 to collect the merged water at high pressure and has a shape that is gradually narrowed in a discharge direction, and a discharge unit 500 which is installed at a narrowed end portion of the water collecting unit 400 and discharges the high-pressure water, and each of the pressure discharge devices 200 includes a storage unit 210 which accommodates the water introduced from the water tub 100 through an inlet port 211, a pressurizing member 220 which discharges the water accommodated in the storage unit 210 in a direction toward the discharge port 212, and a hydraulic operating unit 230 which moves the pressurizing member 220 upward and downward.

[0022] The water tub 100 is installed in a place such as a water intake pool having a large amount of water and has a comparatively large size to store a large amount of water, and the multiple pressure discharge devices 200 are installed in the water tub 100 so as to discharge a large amount of water stored in the water tub 100 to the outside at high pressure. Further, a recovery flow path 600 may be connected to the water tub 100 so as to introduce water from the outside and supplement the water.

[0023] The pressure discharge device 200 is a cylinder type device which broadly includes the storage unit 210, the pressurizing member 220, and the hydraulic operating unit 230 and introduces and discharges the water. The hydraulic operating unit 230 reciprocates by hydraulic pressure supplied from a hydraulic motor which is fixed to an upper portion of the water tub 100 and separately installed. The pressurizing member 220 moves upward and downward in a state in which the pressurizing member 220 is in close contact with an inner wall of the storage unit 210 in order to introduce the water into the storage

unit 210 and discharge the water to the discharge pipe 300. The storage unit 210 is fixedly installed to be spaced apart from a bottom of the water tub 100 so as to be submerged in the water in the water tub 100. The inlet port 211 is formed at a lower side of the storage unit 210 so that the water is introduced directly into the storage unit 210, temporarily stored in the storage unit 210, and then discharged to the discharge port 212.

[0024] The storage unit 210 of the present invention is directly installed in the water tub 100 instead of being connected to the water tub 100 through a separate pipeline, and as a result, the water may quickly flow into and fill the water tub 100 when introducing the water by using the pressurizing member 220, and the installation structure may be simplified. In addition, the storage unit 210 is installed to be submerged in the water so that the water in the water tub 100 may be introduced directly into the storage unit 210, but a problem of a breakdown caused by water does not occur because the hydraulic operating unit 230, which substantially performs the pressurization operation by means of hydraulic pressure, is fixed outside the water in the water tub 100.

[0025] In addition, check valves 240 are installed in the inlet port 211 and the discharge port 212 of the storage unit 210, respectively, such that the discharge port 212 is closed when the inlet port 211 is opened, and the discharge port 212 is opened when the inlet port 211 is closed. The check valves 240 are configured to be closed reversely with respect to each other, thereby enabling the introduction process and the discharge process to be smoothly and alternately performed.

[0026] FIG. 2 is a view illustrating the exemplary embodiment in which the multiple pressure discharge devices 200 of the present invention are installed. The pressure discharge devices 200 are configured as a single set S in which the multiple pressure discharge devices 200 are connected to the single discharge pipe 300. The sets S of the pressure discharge devices 200 may be disposed in parallel, such that the pressure discharge devices 200 may be installed to be arranged in front, rear, left, and right directions. That is, the discharge pipes 300, which are connected to the multiple sets S of the pressure discharge devices 200, respectively, are connected to the single water collecting unit 400, such that a large amount of water is merged and collected at high pressure.

[0027] As illustrated in FIGS. 3 and 4, the multiple pressure discharge devices 200, which constitute the single set S and are connected to the single discharge pipe 300, sequentially perform the pressurization operations to enable the water in the storage units 210 to be continuously discharged to the discharge pipe 300. If the pressurizing members 220 of the pressure discharge devices 200 connected to the single discharge pipe 300 simultaneously move upward and downward at the same position, the introduction and discharge operations are simultaneously performed, and as a result, there is a problem in that the water cannot be continuously discharged. However, the water may be continuously discharged at constant pressure as the pressure discharge devices sequentially perform the pressurization operations.

[0028] Further, the number of multiple pressure discharge devices 200 included in the single set S may be at least three. Two pressure discharge devices 200 may be provided to continuously discharge the water by alternately moving the pressurizing members upward and downward. However, in this case, delay time occurs between a point in time at which the introduction process ends and a point in time at which the discharge process ends, and as a result, at least three pressure discharge devices 200 are installed to minimize the delay time.

[0029] The water collecting unit 400 of the present invention is connected to the multiple discharge pipes 300 to collect the water at high pressure, and has a shape that is gradually narrowed in the discharge direction, such that the water is discharged at high pressure through the discharge unit 500, and as a result, a large amount of water may be easily transferred to remote places.

[0030] An operation of the water transfer apparatus capable of high-pressure discharge according to the present exemplary embodiment, which is configured as described above, will be described below.

[0031] As illustrated in FIG. 1, in a state in which the storage units 210 are filled with the water as the water stored in the water tub 100 flows into the storage units 210 through the inlet ports 211 of the pressure discharge devices 200, the pressurizing members 220 are moved downward by the hydraulic operating units 230 to transfer the water, and the pressurizing members 220 push the water to the discharge ports 212 while moving downward in the state in which the pressurizing members 220 are in close contact with the inner walls of the storage units 210, thereby discharging the water to the discharge pipe 300 connected to rear ends of the discharge ports 212. When discharging the water, the inlet port 211 is closed by the check valve 240, and the discharge port 212 is opened by the check valve 240.

[0032] When the water in the storage unit 210 is completely discharged as the pressurizing member 220 reaches the bottom of the storage unit 210 as described above, the pressurizing member 220, which is in close contact with the inner wall of the storage unit 210, moves upward again, such that the storage unit 210 is filled with the water introduced from the water tub 100 through the inlet port 211. In this case, the check valve 240 in the inlet port 211 is opened, and the check valve 240 in the discharge port is closed. As described above, the pressurizing member 220 reciprocates to enable the water in the water tub 100 to be collected in the water collecting unit 400 through the discharge pipe 300. The multiple pressure discharge devices 200, in which the reciprocating motions are performed, are installed in the water tub 100, thereby transferring a large amount of water.

[0033] Further, as illustrated in FIG. 2, the multiple pressure discharge devices 200 is configured as the single set S including three or more multiple pressure dis-

charge devices 200, and the discharge ports 212 of the pressure discharge devices 200 included in the single set S communicate with the single discharge pipe 300. The sets S of the pressure discharge devices 200 are installed in parallel at four points, and as a result, the pressure discharge devices 200 are installed to be arranged in the front, rear, left, and right directions, such that the multiple discharge pipes 300, which are connected to the sets S, respectively, are connected to the water collecting unit 400.

[0034] Further, as illustrated in FIGS. 3 and 4, the pressure discharge devices 200 included in the set S sequentially perform the pressurization operations to enable the water in the storage units 210 to be continuously discharged to the discharge pipe 300. That is, the water flows at constant pressure through all of the multiple discharge pipes 300 and is collected at high pressure in the water collecting unit 400, and the water is discharged to the discharge unit 500 in a state in which pressure of the water is increased while the water passes through the water collecting unit 400 of which the shape is gradually narrowed in the discharge direction.

[0035] In addition, the water in the water tub 100 may be supplemented from the outside through the recovery flow path 600. Water level sensors are installed at predetermined heights in order to prevent the water from overflowing the water tub 100 or from being insufficient, thereby controlling the water being supplemented through the recovery flow path 600.

[0036] The present invention configured as described above may provide a technology that may transfer a large amount of water at high pressure, which cannot be implemented by an impeller type pump in the related art, and may improve water transfer efficiency with respect to electric power.

[0037] While the present invention has been described with reference to the exemplary embodiment, various modifications may be made within the technical spirit and the scope of the present invention.

Claims

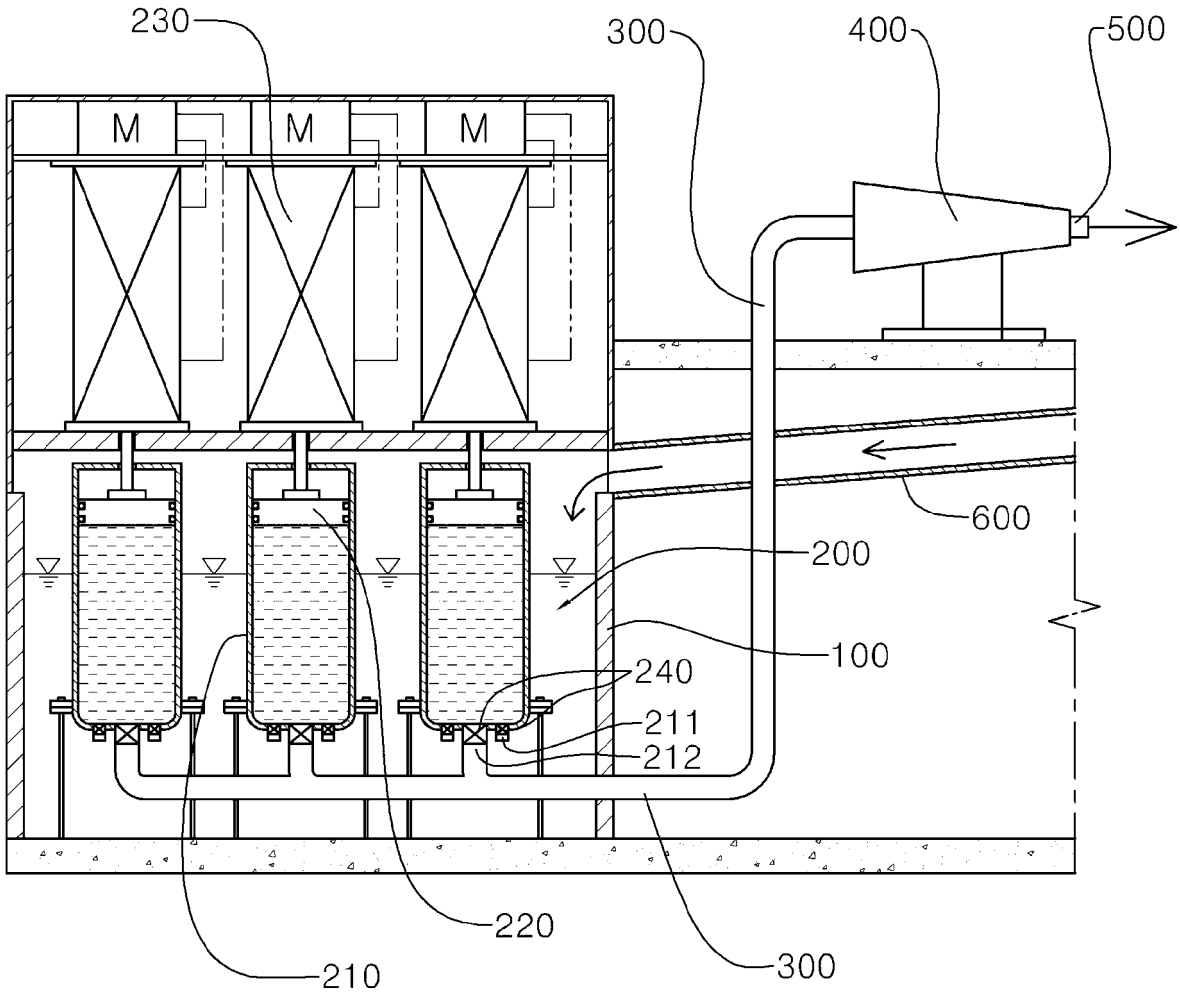
1. A water transfer apparatus capable of high-pressure discharge, the water transfer apparatus comprising:

   a water tub 100 which stores water;
   multiple pressure discharge devices 200 which are installed in the water tub 100, wherein each of the pressure discharge devices 200 includes a storage unit 210 which accommodates the water introduced from the water tub 100 through an inlet port 211, a pressurizing member 220 which discharges the water accommodated in the storage unit 210 in a direction toward a discharge port 212, and a hydraulic operating unit 230 which moves the pressurizing member 220 upward and downward, the storage unit 210 is fixedly installed to be spaced apart from a bottom of the water tub 100 so as to be submerged in the water in the water tub 100, and the hydraulic operating unit 230 is fixedly installed outside the water in the water tub 100;
   multiple discharge pipes 300 which are connected to the discharge ports 212 of the pressure discharge devices 200;
   a water collecting unit 400 which is connected to the multiple discharge pipes 300 to collect the merged water at high pressure and has a shape that is gradually narrowed in a discharge direction; and
   a discharge unit 500 which is installed at a narrowed end portion of the water collecting unit 400 and discharges high-pressure water,
   wherein the pressure discharge devices 200 are configured as a single set S in which the multiple pressure discharge devices 200 are connected to the single discharge pipe 300,
   the sets S of the pressure discharge devices 200 are provided in parallel such that the pressure discharge devices 200 are installed to be arranged in front, rear, left, and right directions, and
   the multiple pressure discharge devices 200 included in the single set S sequentially perform pressurization operations to continuously discharge the water in the storage units 210 to the discharge pipe 300.

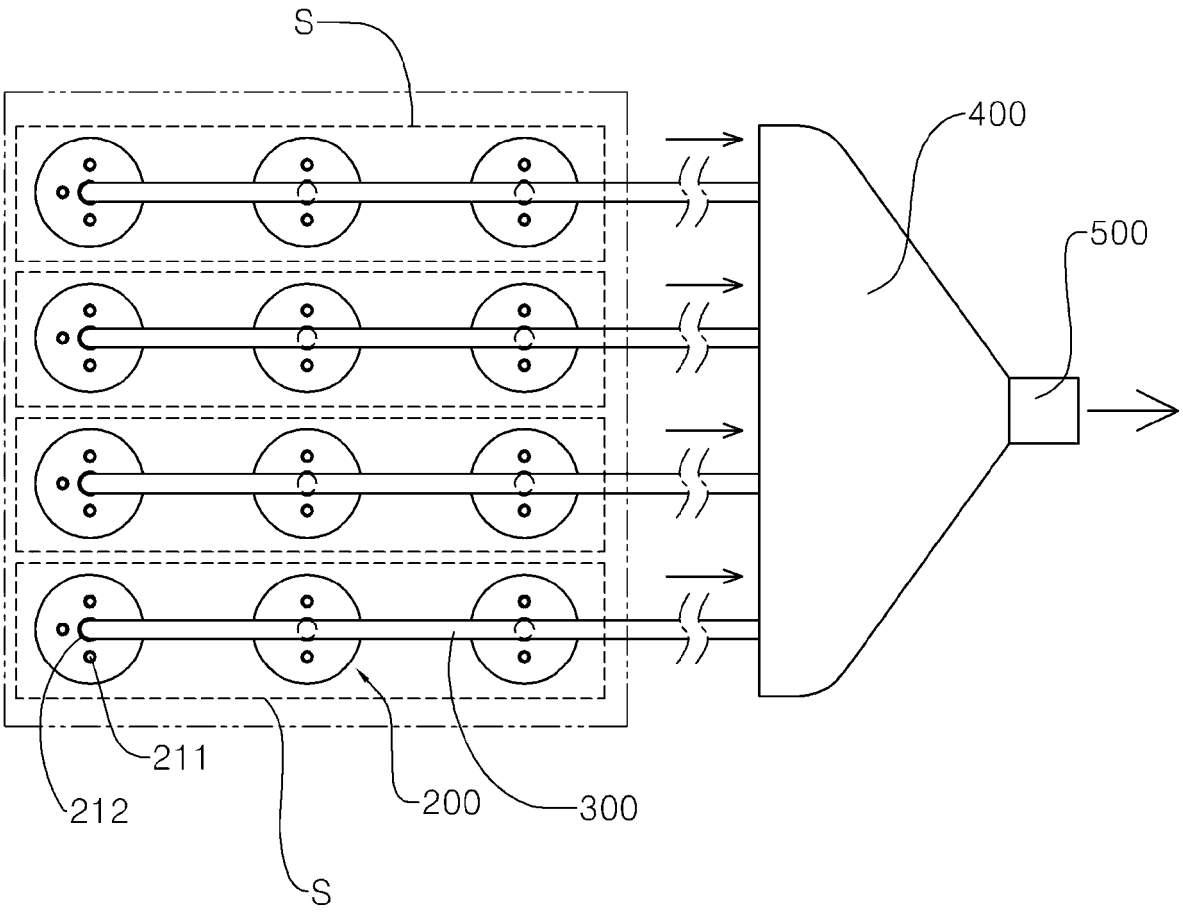
2. The water transfer apparatus of claim 1, wherein the number of multiple pressure discharge devices 200 included in the single set S is at least three.

3. The water transfer apparatus of claim 1, further comprising:
   a recovery flow path 600 which is connected to the water tub 100 and allows the water to be introduced into the water tub 100 from the outside.

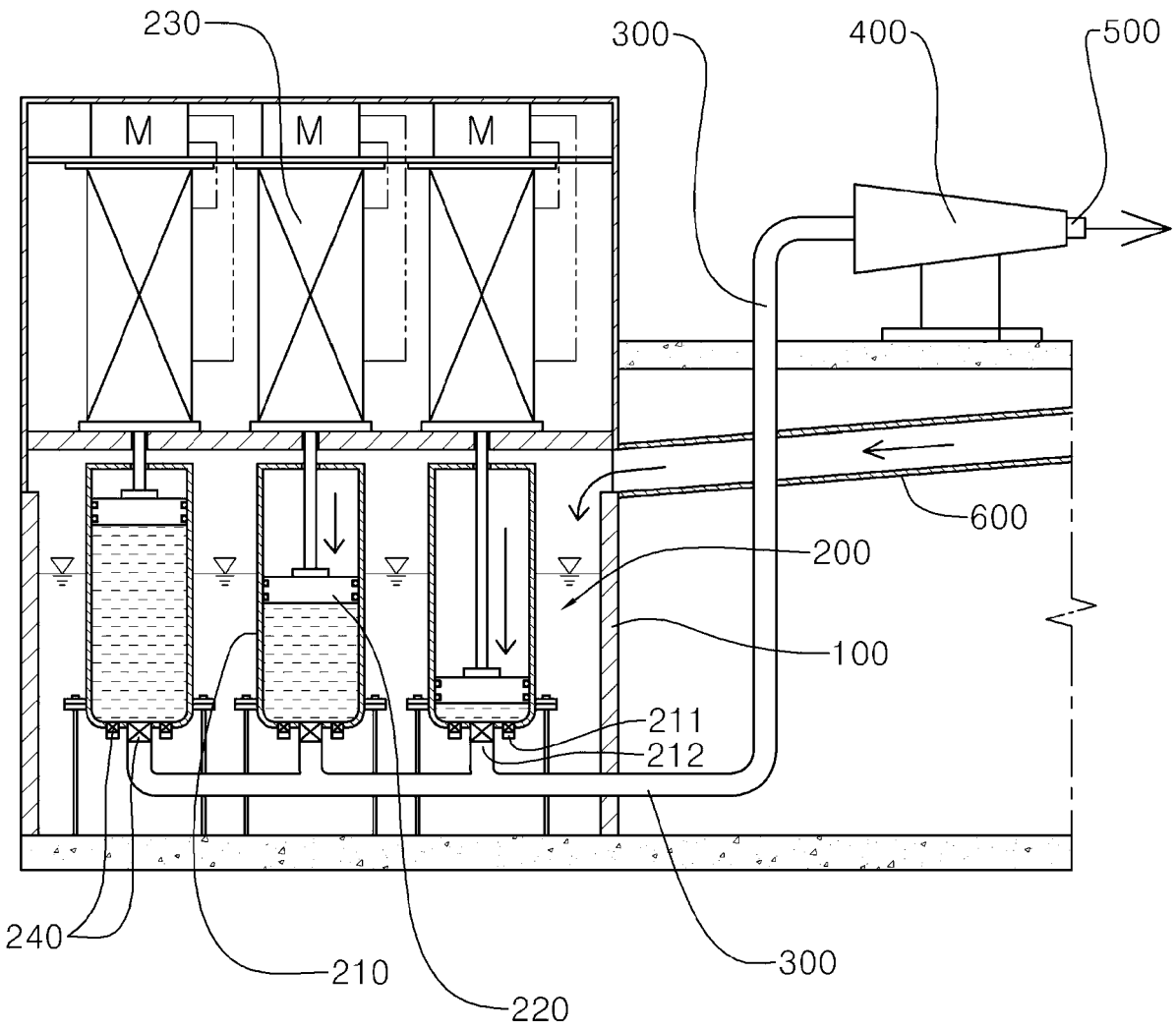
[Fig. 1]



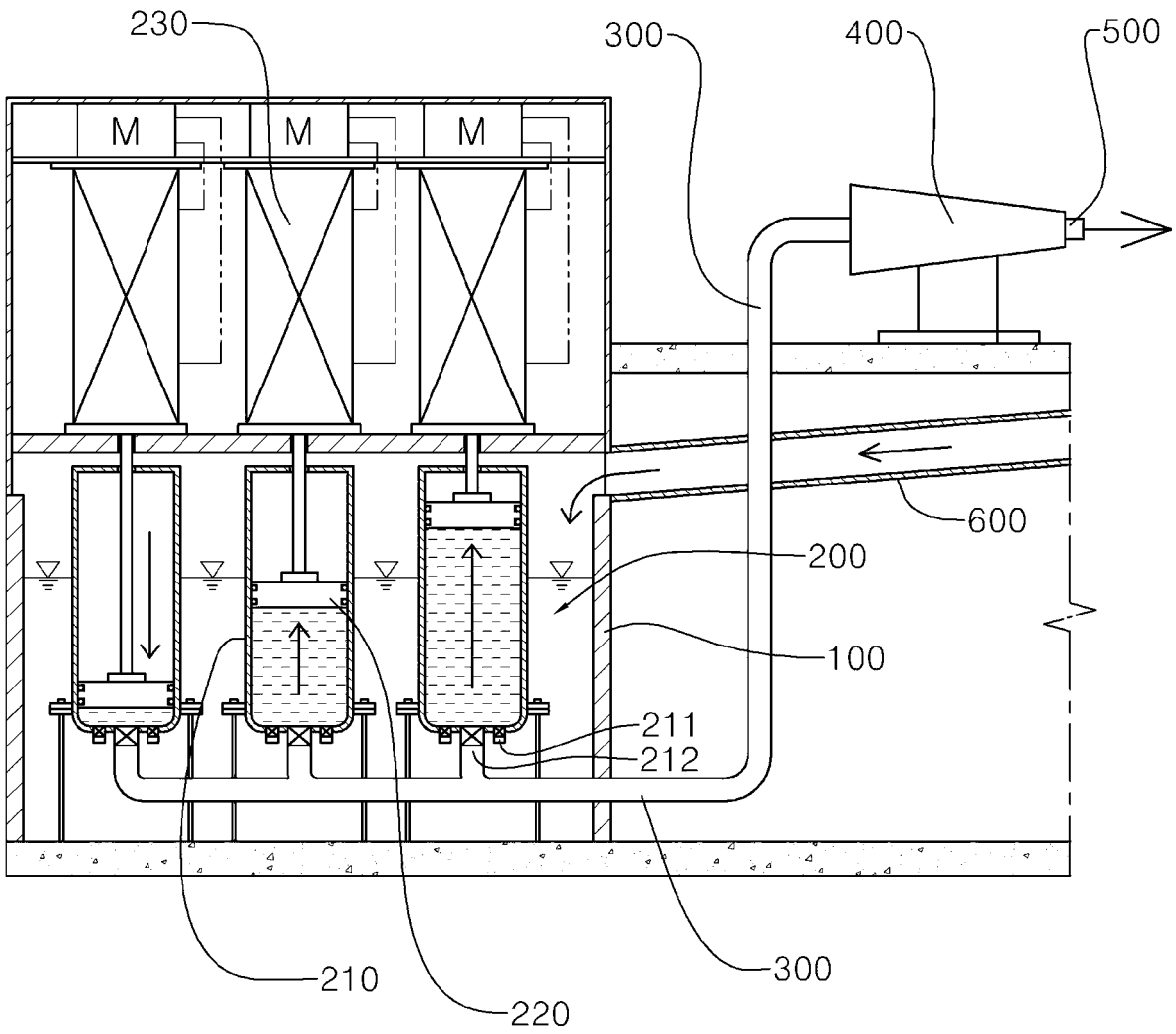
[Fig. 2]



[Fig. 3]



[Fig. 4]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2016/006722

A. CLASSIFICATION OF SUBJECT MATTER

E03B 5/00(2006.01)i, E03B 7/09(2006.01)i, E03B 11/02(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)

E03B 5/00; F04D 13/08; E03B 11/16; F04D 15/02; E03B 5/02; F03B 13/06; F04D 15/00; B65D 88/76; F03B 1/00; E03B 7/09; E03B 11/02

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

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

eKOMPASS (KIPO internal) & Keywords: pressurizing, pump, high pressure water, water collecting part, water transfer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2009-0078615 A (MYUNGJIN DEVELOPMENT CO., LTD.) 20 July 2009 See claim 1 and figures 3-4.	1-3
A	KR 10-2012-0042821 A (PARK, Choon - Keun) 03 May 2012 See claim 1, paragraphs [0019], [0025], and figures 1-3.	1-3
A	JP 2003-328979 A (SHIN MEIWA IND. CO., LTD.) 19 November 2003 See paragraphs [0020]-[0027] and figure 1.	1-3
A	KR 10-1439362 B1 (SAENG-DONG ENGINEERING CO., LTD.) 11 September 2014 See paragraphs [0078]-[0081] and figures 3-6.	1-3
A	KR 10-1250985 B1 (NAMIL CO., LTD.) 05 April 2013 See paragraphs [0049]-[0056] and figures 1-2.	1-3

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

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Date of the actual completion of the international search	Date of mailing of the international search report
25 OCTOBER 2016 (25.10.2016)	**26 OCTOBER 2016 (26.10.2016)**

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Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2016/006722

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-2009-0078615 A	20/07/2009	NONE	
KR 10-2012-0042821 A	03/05/2012	KR 10-2011-0026276 A KR 10-2012-0042788 A	15/03/2011 03/05/2012
JP 2003-328979 A	19/11/2003	NONE	
KR 10-1439362 B1	11/09/2014	NONE	
KR 10-1250985 B1	05/04/2013	NONE	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 1439362 **[0005]**
- KR 467740 **[0007]**