

NON-POWERED FLOOD PREVENTION APPARATUS

Technical Field

[1] The present disclosure relates to a non-powered
5 flooding preventing apparatus that is installed in a
pipeline of a valve chamber in the interior of a manhole
to prevent damage to a valve or a device due to
flooding, and more particularly to a non-powered
10 flooding preventing apparatus of the present disclosure
that prevents corrosion or a disorder of the facilities
due to flooding by automatically opening an
opening/closing valve by a floating tool that is
elevated according to water level and thus rapidly
15 discharging the flooded water in a manhole to the
outside through a suction pipeline by a suction force
generated through an ejector when the manhole is
flooded, makes an immediate measure even without
manipulation by a person during flooding, reduces
20 maintenance costs due to non-powered use thereof,
reduces installation costs and failure rate as compared
with a discharge scheme through a conventional pump, and
increases efficiency and removes foreign substances of
the suction pipeline by setting a temporary stop time
during an operation thereof according to the amount of
25 the water introduced into and discharged from the water
collecting tank installed at an upper portion of the
floating tool.

Background Art

30 [2] Generally, a manhole is buried under the ground
and is installed to be connected to a water and sewage
pipe, an electricity/telegraphy pipeline, a power
transmission pipe, and the like, and because various
facilities may be corroded or break down as flooding
35 frequently occurs due to introduction of a large amount

of rainwater or sewage, a water discharging apparatus in the interior of the manhole is very important in maintenance and management of the manhole.

[3] As the conventional technologies related to water
5 discharging apparatuses in the interior of the manholes,
a radial type manhole including a water discharging
apparatus of Korean Patent Application Publication No.
10-2011-0133208 includes a moisture box connected to one
10 side of a bottom surface of the manhole, a grating
covering an upper portion of the moisture box, a buoyant
body connected to the grating by a connection member,
and a natural water discharging pipe connected to a
bottom surface of the moisture box, a water discharging
15 apparatus of a pump facility of Korean Patent No. 10-
0720930 is a technology in which a underground pump
provided with a filtering net is coupled to a fixing
part installed on one side of a manhole whereby water is
discharged by the underground pump, a manhole apparatus
20 having a water discharging structure of Korean Patent
Application Publication No. 10-2012-0053105 is
configured such that a collector well protruding
downwards in the interior of a manhole is formed, a
water discharging pipe that passes from the interior of
the collector well to the outside to be extracted is
25 formed at a lower portion of a side surface of the
collector well, a check valve that may be opened in one
direction is formed at one end of the water discharging
pipe, which is accommodated in the interior of the
collector well, and a pebble layer is formed at an
30 opposite end of the outside of the collector well of the
water discharging pipe, and a water discharging pump
apparatus of a rainwater/sewage manhole of Korean Patent
No. 20-0322626 is a technology of installing an
underwater motor pump in a circular vessel formed on the
35 bottom of a manhole to discharge water, and a block is

installed in the circular vessel to form vortices and a screw type impeller is formed in the pump.

[4] The conventional technology has a configuration of naturally discharging water through a discharge hole on the bottom of a manhole or discharging water to the outside through a underwater pump, and according to the method of discharging water through natural discharge, continuous management is necessary and a water discharging operation is not smooth during flooding by a large amount of rainwater and sewage because of blocking by foreign substances, and according to the water discharge through the underground pump, a person has to directly operate the system, which is troublesome, and an immediate measure is impossible during flooding, and a predetermined amount of water is not discharged and is always left because of an installation and maintenance cost problem and because the underground pump is structurally installed to be spaced apart from the bottom.

[5] Further, according to the conventional technology, when a sensor that detects the water level of the interior of a manhole sends a signal to a pump to operate the pump, the pump may not be operated even when the water level rises because of foreign substances stuck to a contact point of the sensor due to a long time use thereof, and the water residing in a water discharging pipe may be continuously operated due to a check valve installed on the pump in the case of a cold wave.

[6] In order to solve the problems, the applicant(s) invented a non-powered water discharging apparatus of a manhole of Korean Patent No. 10-1373478, and the non-powered water discharging apparatus of a manhole detects flooding through a floating tool that detects the water level when flooding occurs in the interior of the

manhole, operates an ejector installed in a connection pipeline branched from a manhole pipeline with no power to rapidly discharge the water in the manhole to the outside, thereby preventing corrosion and a disorder of a facility due to flooding in the interior of the manhole and maintaining a clean state.

[7] However, according to the non-powered water discharging apparatus of a manhole, if a predetermined period of time elapses after the water discharging apparatus is operated in a drainage pit of high capacity, the vacuum suction force (efficiency) of the ejector deteriorates after two to twenty minutes as the operation time of the water discharging apparatus becomes longer, the suction pipeline that is connected to the ejector to suction water is blocked by various introduced foreign substances, such as rainwater or sewage whereby water is not discharged, and the water left in the discharge part is frozen due to a cold wave in the winter season by the check valve on the suction pipeline installed to prevent reverse flows, whereby water is not discharged.

[8] [Prior Technical Documents]

[9] [Patent Documents]

[10] (Patent document 1) KR 10-2011-0133208 (Korean Patent Application Publication No.) 2011.12.12.

[11] (Patent document 2) KR 10-2012-0053105 (Korean Patent Application Publication No.) 2012.05.25.

[12] (Patent document 3) KR 10-0720930 (Korean Patent No.) 2007.05.16.

[13] (Patent document 4) KR 20-0322626 (Korean Patent No.) 2003.07.30.

[14] (Patent document 5) KR 10-1373478 (Korean Patent No.) 2014.03.05.

Detailed Description of the Invention

Technical Problem

[15] Accordingly, the present disclosure is made to solve the above-described problems, and

[16] the present disclosure provides a non-powered
5 flooding preventing apparatus that can prevent corrosion or a disorder of the facilities due to flooding by automatically opening an opening/closing valve by a floating tool that is elevated according to the water level and thus rapidly discharging the flooded water in
10 a manhole to the outside through a suction pipeline by a suction force generated through an ejector when the manhole is flooded, makes an immediate measure even without manipulation by a person during flooding, reduces maintenance costs due to non-powered use
15 thereof, reduces installation costs as compared with a discharge scheme through a conventional pump, and increases efficiency by setting a temporary stop time during an operation thereof.

[17] The present disclosure also provides a non-powered
20 flooding preventing apparatus that can remove foreign substances stopped by a suction part of a suction pipeline, which suctions flooded water, with no power by disposing a buoyant force means that is elevated according to a water level on an outer peripheral
25 surface of the suction pipeline.

[18] The present disclosure also provides a non-powered flooding preventing apparatus that can further increase the efficiency of an ejector by providing an operation time (operating time) by continuously opening and
30 closing an opening/closing valve during an operation thereof and performing an opening operation and a closing operation for an operation and a stop thereof, of stopping the operation at a time point at which a suction vacuum force is weakened when flooded water is
35 suctioned in a suction pipeline and performing an

operation again after lapse of a predetermined period of time.

[19] The present disclosure also provides a non-powered flooding preventing apparatus that can manage an operation time and a stop time of an ejector in an optimum state according to a situation of the interior of a manhole by arbitrarily manipulating an opening operation and a closing operation of an opening/closing valve.

[20] The present disclosure also provides a non-powered flooding preventing apparatus that can remove water left in a drain after an operation of an ejector is stopped in an area in which the drain is predicted to be frozen in the winter season and prevent water in the drain from being discharged at a site at which there is no danger of freezing to flexibly cope with the area and the temperature.

Technical Solution

[21] In accordance with an aspect of the present disclosure, there is provided a non-powered flooding preventing apparatus including: a connection pipeline 100 branched from a manhole pipeline 11 in the interior of a manhole body 10, in which a water collecting part 12 is formed on one side of a bottom surface thereof such that the manhole pipeline 11 communicates with the outside; an opening/closing valve 300 installed on one side of the connection pipeline 100 such that a submersion part 130 of the connection pipeline 100 is opened and closed by a floating tool elevated according to the water level of the water collecting part 12; a suction pipeline 400 installed at a lower portion of the water collecting part 12, and in which water in the water collecting part 12 is suctioned through a first filtering net 410 having a plurality of vent holes at a

lower portion thereof; an ejector 500 installed at a rear end of the opening/closing valve 300 of the connection pipeline 100, and connected to the suction pipeline 400 to discharge the water suctioned by the suction pipeline 400 to the outside through a discharge part 150 of the connection pipeline 100; and a water collecting tank 630 configured to collect the water introduced through an introduction pipeline 620 branched from the discharge part 150, provided with a discharge guide hole 631, through which water is discharged, on one side of a bottom surface thereof such that the amount of the water introduced through the introduction pipeline 620 is larger than the amount of the water discharged through the discharge guide hole 631, installed at an upper portion of the floating tool 200 and at a lower portion of the opening/closing valve 300, and configured to, after the floating tool 200 is raised by a buoyant force according to a rise of the water level of the water collecting part 12 and thus the opening/closing valve 300 is opened, repeating closing and opening of the opening/closing valve 300 by repeating lowering and raising of the floating tool 200 by using a load of the water introduced through the introduction pipeline 620 to be collected in a water level state of the water collecting part 200, in which the opening/closing valve 300 is opened by the buoyant force of the floating tool 200.

[22] The introduction pipeline 620 is provided with a first control valve 610 configured to control the amount of the water introduced into the water collecting tank 630, the discharge guide hole 631 is provided with a second control valve 640 configured to control the amount of the water discharged from the water collecting tank 630, and the opening time and the closing time of the opening/closing valve 300 are determined according

to the opening degrees of the first control valve 610 and the second control valve 640.

[23] The operation time and the stop time of the ejector 500 are determined according to the opening
5 degrees of the first control valve 610 and the second control valve 640.

[24] The suction pipeline 400 is provided with a buoyant force means 420 configured to elevate according to the water level of the water collecting part 12 on an
10 outer peripheral surface thereof, a second filtering net 430 having a plurality of vent holes is provided at a lower portion of the buoyant force means 420, and the second filtering net 430 and the first filtering net 410 overlap each other when the buoyant force means 420 is
15 lowered.

[25] The first filtering net 410 is formed on a side surface of a lower portion of the suction pipeline 400, and an upper end of the first filtering net 410 is formed at a location that is lower than a lower end of
20 the second filtering net 430 when the first filtering net 410 is raised by the buoyant force means 420.

[26] A lower end surface 411 of the suction pipeline 400 extends to the outside and protrudes to the outside of the first filtering net 410.

[27] A rear end of a discharge part 150 is provided with a first check valve 160, and the non-powered flooding preventing apparatus further includes a bypass pipe 170 that detours the discharge part 150, and a manual opening/closing valve 180 is further installed in
25 the bypass pipe 170.
30

Advantageous Effects

[28] Accordingly, the non-powered flooding preventing apparatus of the present disclosure prevents corrosion
35 or a disorder of the facilities due to flooding by

automatically opening the opening/closing valve by the floating tool that is elevated according to the water level and thus rapidly discharging the flooded water in the manhole to the outside through the suction pipeline by a suction force generated through the ejector when the manhole is flooded, makes an immediate measure even without manipulation by a person during flooding, reduces maintenance costs due to non-powered use thereof, reduces installation costs as compared with a discharge scheme through a conventional pump, and increases efficiency by setting a temporary stop time during an operation thereof according to the amount of the water introduced into and discharged from the water collecting tank installed at an upper portion of the floating tool.

[29] The non-powered flooding preventing apparatus of the present disclosure can remove foreign substances stopped by a suction part of a suction pipeline, which suctions flooded water, with no power by disposing a buoyant force means that is elevated according to a water level on an outer peripheral surface of the suction pipeline, thereby increasing suction efficiency.

[30] The non-powered flooding preventing apparatus of the present disclosure can further increase the efficiency of an ejector by providing an operation time (operating time) by continuously opening and closing an opening/closing valve during an operation thereof and performing an opening operation and a closing operation for an operation and a stop thereof, of stopping the operation at a time point at which a suction vacuum force is weakened when flooded water is suctioned in a suction pipeline and performing an operation again after lapse of a predetermined period of time.

[31] The non-powered flooding preventing apparatus of the present disclosure can allow an opening/closing

valve to arbitrarily open and close whereby an operation time and a stop time of an ejector may be operated in an optimum state according to a situation in the interior of a manhole.

5 [32] According to the non-powered flooding preventing apparatus of the present disclosure, a first check valve is installed in a discharge part, through which water is discharged to the outside and a manual opening/closing valve is installed in a bypass pipeline whereby the
10 first check valve or the manual opening/closing valve may be selectively used according to the field condition, and a local area and temperature can be flexibly coped with because water left in a drain after the operation of the ejector is stopped in an area in
15 which freezing of the drain is predicted in the winter season and water of the drain is not discharged at a site at which there is no danger of freezing.

Brief Description of the Drawings

20 [33] FIG. 1 is a view illustrating installation of a non-powered flooding preventing apparatus according to an embodiment of the present disclosure;

[34] FIG. 2 is an enlarged view illustrating a configuration of the non-powered flooding preventing apparatus according to the embodiment of the present disclosure;
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[35] FIG. 3 is an enlarged perspective view illustrating a suction pipeline of the non-powered flooding preventing apparatus according to the embodiment of the present disclosure;
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[36] FIG. 4 is an enlarged view illustrating a discharge state of the non-powered flooding preventing apparatus according to the embodiment of the present disclosure;

[37] FIG. 5 is a graph depicting an operation time and a stop time of the non-powered flooding preventing apparatus according to the embodiment of the present disclosure;

5 [38] FIG. 6A is an enlarged view illustrating a stop state of the non-powered flooding preventing apparatus according to the embodiment of the present disclosure; and

10 [39] FIG. 6B is an enlarged view illustrating an operation state of the non-powered flooding preventing apparatus according to the embodiment of the present disclosure.

Mode for Carrying Out the Invention

15 [40] Hereinafter, a preferred embodiment of the present disclosure will be described with reference to the accompanying drawings so that an ordinary person skilled in the art to which the present disclosure pertains may easily carry out the present disclosure.

20 [41] As illustrated in FIGS. 1 to 6, a non-powered flooding preventing apparatus of the present disclosure includes

[42] a connection pipeline 100 branched from a manhole pipeline 11 in the interior of a manhole body 10, in
25 which a water collecting part 12 is formed on one side of a bottom surface thereof such that the manhole pipeline 11 communicates with the outside;

[43] an opening/closing valve 300 installed on one side of the connection pipeline 100 such that a submersion
30 part 130 of the connection pipeline 100 is opened and closed by a floating tool elevated according to the water level of the water collecting part 12;

[44] a suction pipeline 400 vertically installed in the water collecting part 12, and in which water in the water collecting part 12 is suctioned through a first
5 filtering net 410 having a plurality of vent holes on a side e of a lower portion thereof; and

[45] an ejector 500 installed at a rear end of the opening/closing valve 300 of the connection pipeline 100, and connected to the suction pipeline 400 to
10 discharge the water suctioned by the suction pipeline 400 to the outside through a discharge part 150 of the connection pipeline 100.

[46] The non-powered flooding preventing apparatus of the present disclosure is a water discharging apparatus
15 installed in a water collecting part 12 formed on a bottom of a manhole, and is installed in a connection pipeline 100 branched from a manhole pipeline 11 such that an opening/closing valve 300 of the connection pipeline 100 is automatically opened through a floating
20 tool 200 that is raised by a buoyant force when the interior of the manhole is flooded due to introduction of rainwater and sewage, the water introduced into the connection pipeline 100 and the flooded water are discharged to the outside through an ejector 500, and a
25 time for opening and closing the opening/closing valve 300 is adjusted by the amount of the water introduced into and discharged from the water collecting tank 630 installed at an upper portion of the floating tool 200.

[47] The present disclosure solves the problems of the
30 conventional technologies while employing the configurations of Korean Patent No. 10-1373478 filed by the applicant(s). Accordingly, the configurations and effects of the conventional technology will be simply described.

[48] The non-powered flooding preventing apparatus discharges water by using pressurized fluid in a pipeline, may be installed at any site as long as a pressure pipeline is present because it requires no electric power supply, is easily maintained and managed with a simple structure, may be optimized for a user and a device because it is safer than a pump that uses electricity, is economically maintained and managed because it is simply installed at an initial stage and automatically detects flooding, and is installed at a site at which a water discharging facility has to be installed (a site at which a device is predicted to be damaged by flooding), a valve chamber having no electricity, or a site at which there is a danger of a short-circuit of a discharge pump due to frequent flooding.

[49] The connection pipeline 100 of the present disclosure is installed to be branched from the manhole pipeline 11 installed in the interior of the manhole body 10 to communicate with the outside, and normally is maintained in a state in which it is interrupted by the opening/closing valve 300 installed in the water collecting part 12. The connection pipeline 100 includes a submersion part 130 located on the front side of the opening/closing valve 300, and a discharge part 150 configured to discharge the water in the water collecting part 12 that is introduced through the suction pipeline 400 after the opening/closing valve 300 is opened by the floating tool 200 to operate the ejector 500 during flooding to the outside.

[50] The connection pipeline 100 includes a first strainer including a filter, such that sand, pebbles, fallen leaves, vinyl, tree branches in a pipeline, which filters out foreign substances, a faucet gauge 120 installed around the first strainer 110, a submersion

part 130 located on the front side of the opening/closing valve 300, a second strainer 140 that is a filter provided in the submersion part 130, and a discharge part 150, through which the water in the water
5 collecting part 12, which is introduced through the suction pipeline 400, is discharged on the rear side of the ejector 500.

[51] The first strainer 110 is disposed at a front end of the faucet gauge 120 and primarily filters out
10 foreign substances, and the second strainer 140 is located at a front end of the opening/closing valve 300 to filter out foreign substances that are smaller than the first strainer 110.

[52] The floating tool 200 is installed at a lower
15 portion of the opening/closing valve 300 and is elevated vertically by a buoyant force of the water introduced into the water collecting part 12 to open and close the opening/closing valve 300. The floating tool may have various angular shapes, including a circular shape or an
20 elliptical shape.

[53] The opening/closing valve 300, as illustrated in FIG. 6, includes an opening/closing member 311 configured to open and close the connection pipeline 100, a spring 312 adhered to a rear end of the
25 opening/closing member 311 to block the pipeline and fixed to a support 310, and an operating body 320 installed at an upper end of the floating tool 200, having a guide groove 321 that allows the support 310 to be inserted, and provided with a magnet 322 at a
30 circumference of a side part of the guide groove 321 to open the opening/closing member 311 by a magnetic force.

[54] In the opening/closing valve 300, the opening/closing member 311 normally maintains a state in which the pipeline is blocked by the spring 312, the
35 operating body 320 installed at an upper end of the

floating tool 200 is fitted with the support 310 while the floating tool 200 is raised by the flooding level during flooding, and the opening/closing member 311 is pulled toward the magnet in the support body 310 in the interior of the operating body 320 whereby the ejector 500 is operated in a state in which the pipeline is opened.

[55] According to the opening/closing valve 300, the floating tool 200 that is elevated by the flooding level closes or opens the opening/closing valve 300, an immediate measure can be made and a simple management is possible according to the flooded and introduced water even without a troublesome of operating the opening/closing valve 300 by the user and without using an electrical facility.

[56] Meanwhile, according to the non-powered flooding preventing apparatus, a water collecting tank 630, in which the water branched and discharged from the discharge part 150 through the introduction pipeline 620 connected to a first control valve installed in the discharge part 150 is installed at an upper portion of the floating tool 200 and at a lower portion of the operating body 320, and a discharge guide hole 631, through which a small amount of water is discharged, is formed on one side of a bottom surface of the water collecting tank 630.

[57] According to the non-powered flooding preventing apparatus, the water flooded through the discharge part 150 is discharged to the outside if the opening/closing valve 300 of the connection pipeline 100 is opened as the floating tool 200 is raised and thus the ejector 500 is operated, a predetermined amount of water is introduced into the water collecting tank 630 through the introduction pipeline 620 that is a branch pipeline installed at a rear end of the ejector 500, and the

opening/closing valve 300 is closed and stopped whereby the discharging of the flooded water is stopped if the load of the water introduced into the water collecting tank 630 becomes larger than the buoyant force of the floating tool. 200 and thus the floating tool 200 is lowered.

[58] The first control valve 610 is installed on the rear side of the ejector 500, and introduces the flooded water discharged from the suction pipeline 400 through the ejector 500 into the water collecting tank 630 through the introduction pipeline 620. The first control valve 610 is installed in the discharge part 150, but may be installed on the introduction pipeline 620. The velocity of the water introduced into the water collecting tank 630 is determined according to the opening degree of the first control valve 610, and the opening/closing valve 300 is rapidly closed after being opened when the first control valve 610 has to be opened by a large degree, and it takes a long time until the opening/closing valve is closed after being opened when the first control valve has to be opened by a small degree. If the opening/closing valve 300 is closed and thus water is not delivered from the ejector, the water is not delivered to the introduction pipeline 620 either whereby the water is not collected to the water collecting tank 630 further.

[59] Then, a lower portion of the water collecting tank 630 is provided with a discharge guide hole 631, through which the water is discharged, a second control valve 640 configured to control the opening degree of the discharge guide hole 631 is provided such that the water is discharged through the discharge guide hole, the amount of the water in the interior of the water collecting tank 630 decreases as the water is discharged whereby the floating tool 200 is raised if the weight of

the water collecting tank is smaller than the buoyant force of the floating tool 200, and accordingly, the opening/closing valve 300 is opened such that the water is delivered from the suction pipeline 400 through the ejector 500 and the non-powered flooding preventing apparatus is operated again. If the non-powered flooding preventing apparatus is operated again in this way, the water is delivered to the introduction pipeline 520 again through the discharge part and the water is collected in the water collecting tank 630.

[60] Here, if the second control valve 640 is opened by a large degree, the amount of the water discharged from the water collecting tank 630 becomes larger whereby the closing time (for a stop) of the opening/closing valve 300 becomes shorter, and if the second control valve 640 is opened by a small degree, the amount of the water discharged from the water collecting tank becomes smaller whereby the closing time (for a stop) of the opening/closing valve 300 becomes longer.

[61] In this way, by repeating an operation of operating and stopping, and again operating and stopping the non-powered flooding preventing apparatus, the efficiency of discharging water is increased as compared with the conventional water discharging apparatus that is continuously operated in a state in which the water is in the water collecting part 12.

[62] The ejector generates a vacuum suction force by ejecting the water introduced through the connection pipeline 100 while the opening/closing valve 300 is opened through a nozzle at a high velocity, and the water in the water collecting part 12 is discharged to the discharge part 150 together by a suction force along the suction pipeline 400 connected to a lower portion of the ejector 500. The configuration and the operation of the ejector 500 has been described in the related art

registered by the applicant(s), and thus a detailed description will be omitted in the present disclosure.

[63] However, when the suction pipeline 400 is suctioned the flooded water by a vacuum suction force of then introduced water ejected by the nozzle , the vacuum suction force is not always maintained but is weakened after lapse of a predetermined period of time. The weakening period of time varies according to the structure and the size of the ejector, the power of the pump, and the pressure of the introduced water, and the vacuum suction force is generally weakened as two to fifteen minutes passes. If the vacuum suction force is weakened, a force of pulling up the flooded water from the suction pipeline 400 is weakened whereby the amount of the discharged water becomes smaller.

[64] According to the present disclosure, in order to reinforce the vacuum suction force that is weakened according to lapse of a predetermined period of time, the water collecting tank 630 is moved upwards and downwards, and the ejector 500 may be operated only while the vacuum suction force is maintained maximally by stopping the operation of the opening/closing valve 300 at a time point at which the vacuum suction force is weakened while the opening/closing valve 300 is opened and closed and then opening the opening/closing valve 300 again. FIG. 5A illustrates an operation (operating) time and a stop time of the opening/closing valve 300, and FIG. 5B illustrates the amount of the water collected in the interior of the water collecting tank 630. In FIG. 5B, in the water collecting tank 630, the amount of water increases until the opening/closing valve 300 is closed since the water starts to be collected from an moment at which the opening/closing valve 300 is opened and the ejector is operated, and water is not introduced from the introduction pipeline

620 and only the water discharged through the discharge guide hole 631 is present whereby the amount of the water gradually decreases if the opening/closing valve is closed, if the amount of the water in the water
5 collecting tank decreases and the floating tool 200 is raised, the opening/closing valve 300 is opened again and the water is introduced from the introduction pipeline 620 whereby the amount of the water in the water collecting tank 630 increases. The opening and
10 closing operations of the opening/closing valve 300 are repeated while the above-described operations are repeated, and the discharge efficiency of the water may be increased by controlling the operation (operating) time only at a moment at which the vacuum suction force
15 of the ejector 500 is maintained at a maximum value.

[65] The amount of the water introduced into the water collecting tank 630 is controlled by the first control valve 610, the amount of the water discharged through the discharge guide hole 631 is controlled by the second
20 control valve 640 installed in the discharge guide hole 631, the water may be collected in the water collecting tank 630 when the amount of the water introduced into the water collecting tank 630 through the introduction pipeline 620 is set to be larger than the amount of the
25 water discharged through the discharge guide hole 631, and the stop time and the operation time cannot be set when the amount of the water discharged through the discharge guide hole 631 is larger than the amount of the water introduced into the water collecting tank 630.

30 [66] Accordingly, the first control valve 610 controls the operation time of the non-powered flooding preventing apparatus, and the second control valve 640 is provided to control the period of time for which the non-powered flooding preventing apparatus is stopped
35 according to the field.

[67] The suction pipeline 400 has a problems of the suction part of the non-powered water discharging apparatus already filed by the applicant(s) being blocked by foreign substances, and in the present
5 disclosure, a first filtering net 410 having a closed lower end surface 411 and having a plurality of vent holes on a side surface thereof is provided to the suction part.

[68] The suction pipeline 400 is installed vertically
10 at a height that is spaced apart from the bottom of the water collecting part 12 by a predetermined height, an upper end of the suction pipeline is connected to the ejector 500, a buoyant force means 420 installed to be moved upwards and downwards according to the water level
15 of the water collecting part 12 is installed on an outer peripheral surface of the suction pipeline 400, and a second filtering net 430 formed a lower portion of the buoyant force means 420 is configured to overlap the first filtering net 410.

[69] The lower end surface 411 extends to the outside and protrudes to the outside of the first filtering net 410 such that the second filtering net 430 and the first
20 filtering net 410 overlap each other and the second filtering net 430 is stopped at a lower portion of the lower end surface 411.
25

[70] A buoyant body having a general circular shape, an elliptical shape, or an angular shape may be used as the buoyant force means 420, and as in FIG. 3, may be provided on an outer peripheral surface of the suction
30 pipeline 400 in a shape, the diameter of which is larger than that of the suction pipeline 400, a lower portion of the buoyant body is opened, and the interior of the buoyant body is an empty space. The water in the water collecting part 12 is introduced into the interior and
35 an air bag is formed in the interior and is elevated

according to the water level, and the second filtering net 430 having a plurality of vent holes at a lower portion thereof overlaps the first filtering net 410, and foreign substances are raked and removed when the
5 foreign substances are raised and lowered while being caught by the first filtering net 410.

[71] An upper end of the first filtering net 410 is located to be lower than the maximum height of the second filtering net 430, which is raised by a buoyant
10 force.

[72] The non-powered flooding preventing apparatus of the present disclosure is a water discharging apparatus installed in a water collecting part 12 formed on a bottom of a manhole, and is installed in the connection
15 pipeline 100 branched from a manhole pipeline 11 the flooded water is discharged to the discharge part 150 of the connection pipeline 100 by operating the opening/closing valve 300 and the ejector 500 during flooding, if the interior of the manhole is flooded due
20 to introduction of rainwater and sewage in a state in which the water normally introduced into the submersion part 130 is blocked by the opening/closing valve 300, the floating tool 200 is raised vertically by a buoyant force and the opening/closing valve 300 is opened.

[73] Then, in the opening/closing valve 300, the support 310 is partially inserted into the guide groove 321 of the operating body 320 installed at an upper portion of the floating tool 200, and the opening/closing member 311 is pulled toward the magnet
30 322 by a magnetic force of the magnet 322 provided in the guide groove 321, and the pipeline is opened while the spring 312 is compressed in the support by the magnetic force.

[74] If the opening/closing valve 300 is opened, the
35 water in the water collecting part 12 is discharged to

the outside through the discharge part 150 along the suction pipeline 400 connected to a lower portion of the opening/closing valve 300 by the suction force generated through the ejector 500, and the discharge part 150 is
5 provided with the first check valve 160 whereby the water discharged to the discharge part 150 is not reversed.

[75] Because the non-powered water discharging apparatus according to the present disclosure are
10 frequently installed outdoors and the water gathers even at the rear end of the check valve 160 in the case of a cold wave, the water in the interior of the discharge part is frozen even at the rear end of the discharge part and the discharge part is blocked. According to the
15 present disclosure, a manual opening/closing valve 180 is further installed in the bypass pipe 170 to prevent a phenomenon of blocking the discharge pipe due to the cold wave, thereby preventing the water from being left in the discharge part 150.

20 [76] That is, according to the non-powered flooding preventing apparatus of the present disclosure, the first check valve 160 and the manual opening/closing valve 180 is selectively used according to a field in the case of a cold wave, and the water in the interior
25 of the discharge part is removed by opening the manual opening/closing valve 180 located in the bypass pipe 170 in the field in which water in the discharge part may be frozen and the manual opening/closing valve 180 is closed in the field in which the discharge part is not
30 frozen. Because the water in the interior of the discharge part is reversed if the manual opening/closing valve 180 is opened, the water gathers in the water collecting part 12. Accordingly, the opening of the manual opening/closing valve is provided to solve a
35 bigger problem generated due to freezing in the

discharge part in spite of the problem, and has to be used to be suitable for the situations of the local areas.

[77] The non-powered flooding preventing apparatus of the present disclosure prevents corrosion or a disorder of the facilities due to flooding by automatically opening the opening/closing valve 300 by the floating tool 200 that is elevated according to the water level and thus rapidly discharging the flooded water in the manhole to the outside through the suction pipeline 400 by a suction force generated through the ejector 500 when the manhole is flooded, makes an immediate measure even without manipulation by a person during flooding, reduces maintenance costs due to non-powered use thereof, reduces installation costs as compared with a discharge scheme through a conventional pump, and increases efficiency by setting a temporary stop time during an operation thereof according to the amount of the water introduced into and discharged from the water collecting tank 630 installed at an upper portion of the floating tool 200.

[78] Further, according to the non-powered flooding preventing apparatus of the present disclosure, suction efficiency can be increased by removing foreign substances caught by the first filtering net 410 while the second filtering net 430 formed at a lower portion of the buoyant force means 420 that is elevated vertically according to the water level overlaps the first filtering net 410 formed at a lower portion of the suction pipeline 400 on an outer peripheral surface of the suction pipeline 400 that suctions the flooded water.

[79] Further, the non-powered flooding preventing apparatus of the present disclosure can further increase operation efficiency by setting an operation time and a

stop time during an operation thereof by using the first control valve 610 installed in the introduction pipeline 620, through which the water is introduced into the water collecting tank 630 and the second control valve 640 installed in the discharge guide hole 631, through which the water is discharged from the water collecting tank 630.

[80] Further, according to the non-powered flooding preventing apparatus of the present disclosure, by installing the first check valve 160 in the discharge part 150, to which the water is discharged to the outside and installing the manual opening/closing valve 180 in the bypass pipe 170 such that the first check valve 160 or the manual opening/closing valve 180 is selectively used according to the field condition, a drain is not frozen in the winter season, the discharge function is always maintained, costs can be reduced as compared with management costs of an electrical water discharging apparatus, and a failure rate can be lowered due to a simple structure and a simple function.

[81] [Description of Reference Numerals]

[82] 10: manhole body 11: manhole pipeline

[83] 12: water collecting part 100: connection pipeline

[84] 110: first strainer 120: faucet gauge

[85] 130: submersion part 140: second strainer

[86] 150: discharge part 160: first check valve

[87] 170: bypass pipe 180: manual opening/closing valve

[88] 200: floating tool 300: opening/closing valve

[89] 310: support 311: opening/closing member

[90] 312: spring 320: operating body

[91] 321: guide groove 322: magnet

[92] 400: suction pipeline 410: first filtering net

[93] 411: lower end surface 420: buoyant force means

[94] 430: second filtering net 500: ejector

- [95] 610: first control valve 620: introduction
pipeline
- [96] 630: water collecting tank 631: discharge guide
hole
- 5 [97] 640: second control valve
- [98]

Claims

1. A non-powered flooding preventing apparatus comprising:

5 a connection pipeline (100) branched from a manhole pipeline (11) in the interior of a manhole body (10), in which a water collecting part (12) is formed on one side of a bottom surface thereof such that the manhole pipeline (11) communicates with the outside;

10 an opening/closing valve (300) installed on one side of the connection pipeline (100) such that a submersion part (130) of the connection pipeline (100) is opened and closed by a floating tool elevated according to the water level of the water collecting part (12);

15 a suction pipeline (400) installed at a lower portion of the water collecting part (12), and in which water in the water collecting part (12) is suctioned through a first filtering net (410) having a plurality of vent holes at a lower portion thereof;

20 an ejector (500) installed at a rear end of the opening/closing valve (300) of the connection pipeline (100), and connected to the suction pipeline (400) to discharge the water suctioned by the suction pipeline (400) to the outside through a discharge part (150) of the connection pipeline (100); and

25 a water collecting tank (630) configured to collect the water introduced through an introduction pipeline (620) branched from the discharge part (150), provided with a discharge guide hole (631), through which water is discharged, on one side of a bottom surface thereof such that the amount of the water introduced through the introduction pipeline (620) is larger than the amount of the water discharged through the discharge guide hole (631), installed at an upper

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portion of the floating tool (200) and at a lower portion of the opening/closing valve (300), and configured to, after the floating tool (200) is raised by a buoyant force according to a rise of the water level of the water collecting part (12) and thus the opening/closing valve (300) is opened, repeating closing and opening of the opening/closing valve (300) by repeating lowering and raising of the floating tool (200) by using a load of the water introduced through the introduction pipeline (620) to be collected in a water level state of the water collecting part (200), in which the opening/closing valve (300) is opened by the buoyant force of the floating tool (200).

2. The non-powered flooding preventing apparatus of claim 1, wherein the introduction pipeline (620) is provided with a first control valve (610) configured to control the amount of the water introduced into the water collecting tank (630),

wherein the discharge guide hole (631) is provided with a second control valve (640) configured to control the amount of the water discharged from the water collecting tank (630), and

wherein the opening time and the closing time of the opening/closing valve (300) are determined according to the opening degrees of the first control valve (610) and the second control valve (640).

3. The non-powered flooding preventing apparatus of claim 2, wherein the operation time and the stop time of the ejector (500) are determined according to the opening degrees of the first control valve (610) and the second control valve (640).

4. The non-powered flooding preventing apparatus of claim 1, wherein the suction pipeline (400) is provided with a buoyant force means (420) configured to elevate according to the water level of the water
5 collecting part (12) on an outer peripheral surface thereof,

wherein a second filtering net (430) having a plurality of vent holes is provided at a lower portion of the buoyant force means (420), and

10 wherein the second filtering net (430) and the first filtering net (410) overlap each other when the buoyant force means (420) is lowered.

5. The non-powered flooding preventing
15 apparatus of claim 4, wherein the first filtering net (410) is formed on a side surface of a lower portion of the suction pipeline (400), and

wherein an upper end of the first filtering net (410) is formed at a location that is lower than a lower
20 end of the second filtering net (430) when the first filtering net (410) is raised by the buoyant force means (420).

6. The non-powered flooding preventing
25 apparatus of claim 1, wherein a rear end of a discharge part (150) is provided with a first check valve (160), and

wherein the non-powered flooding preventing apparatus further comprises a bypass pipe (170) that
30 detours the discharge part (150), and a manual opening/closing valve (180) is further installed in the bypass pipe (170).