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J. W. MCGARRY ET AL

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WATER SERVICE DEVICE

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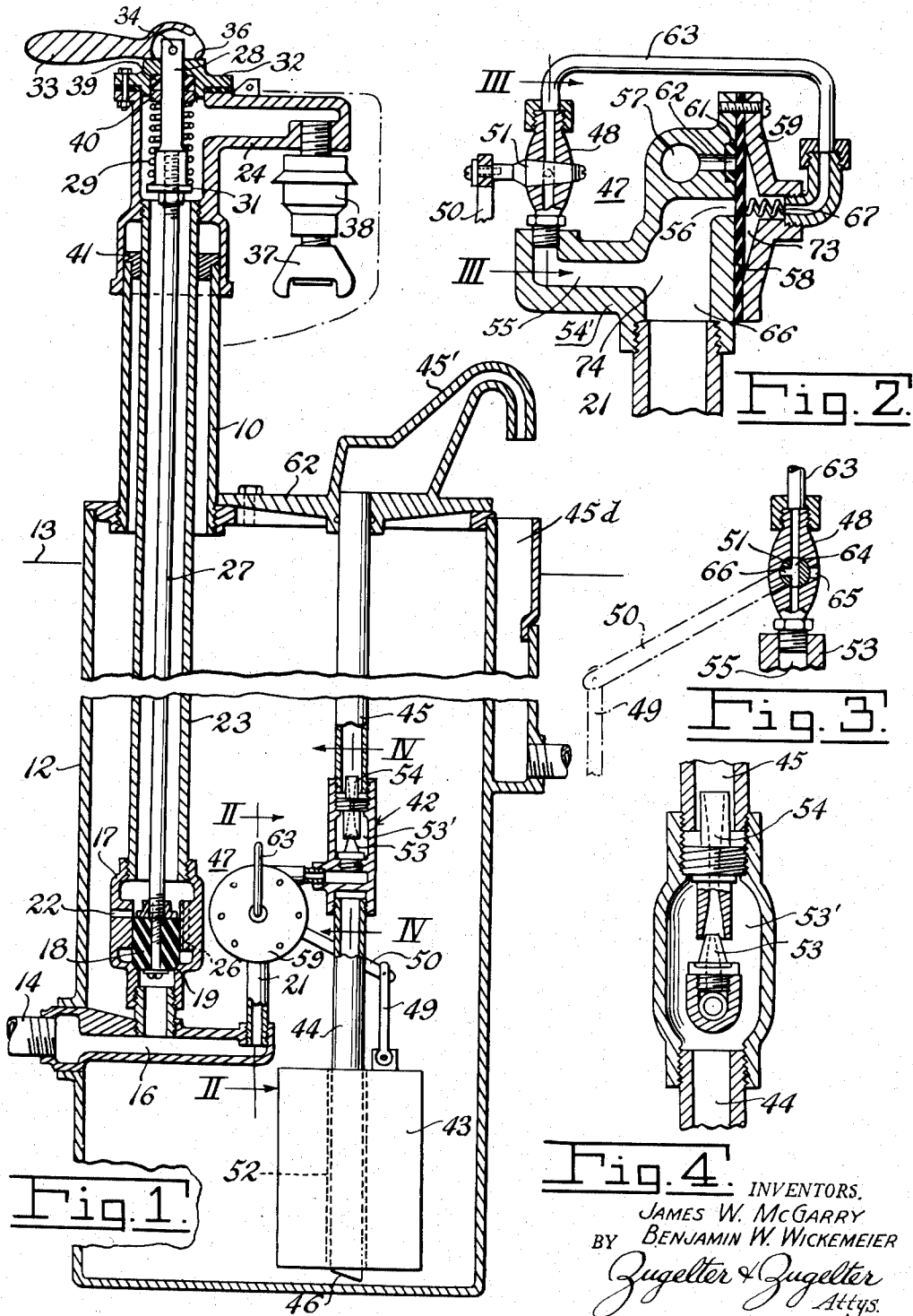


Fig. 4. INVENTORS.
JAMES W. MCGARRY
BY BENJAMIN W. WICKEMEIER
Zugelster & Zugelster
Attys.

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WATER SERVICE DEVICE

James W. McGarry, Cincinnati, and Benjamin W. Wickemeier, Hamilton County, Ohio, assignors to Railroad Products Company, Cincinnati, Ohio, a corporation of Ohio

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1 Claim. (Cl. 137-652)

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This invention relates to hydrants and more particularly relates to hydrants which, because of exposure to freezing temperatures, require drainage of the riser water after each use to avoid freezing of water in the risers. This application is concerned with a hydrant having a construction of the type generally shown in the copending application Serial No. 524,392 filed February 29, 1944 of John T. McGarry, now Patent No. 2,578,143. More particularly, this invention relates to apparatus for disposing of riser drainage.

Hydrants of the type used in supplying railroad cars with potable water may be installed in exposed locations in railroad yards where they are subject to freezing weather, and during winter, riser water must be drained from the hydrants to prevent freezing. However, the riser water cannot be discharged directly to a drain or sewer because of the danger of contamination from sewage, and an object of this invention is to provide simple, readily constructed apparatus for removing riser water from a hydrant without danger of contaminating potable water supplied by the hydrant.

In the aforementioned copending application, apparatus is shown in which riser water is discharged from a riser into a reservoir or accumulator from which the riser drainage water may periodically be removed by means of an aspirator or water jet ejector. The ejector is operated by water supplied from a water main.

A further object of this invention is to provide a novel means for starting the ejector when a certain amount of water has accumulated and stopping the ejector when the accumulated water or a predetermined amount thereof has been removed therefrom.

A still further object of this invention is to provide a simple float actuated mechanism for starting and stopping the ejector.

A further object of this invention is to provide a simple, foolproof diaphragm valve controlled by a float operated pilot valve for starting and stopping a jet ejector of this type.

A further object of this invention is to provide a diaphragm-type valve adapted to control the supply of water to a jet ejector and a float operated pilot valve adapted to control the pressures acting on opposite sides of the diaphragm to thereby either open or close the diaphragm valve.

A further object of this invention is to provide an improved diaphragm-type valve and means for controlling a diaphragm-type valve.

The above and other objects and features of

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the invention will in part be apparent and in part be obvious from the following detailed description of the invention as illustrated in the drawing, in which:

Figure 1 is a view in vertical section of a hydrant including riser drainage discharge apparatus constructed in accordance with an embodiment of this invention.

Fig. 2 is a view in section taken along a line II-II Fig. 1.

Fig. 3 is a view in section taken along a line III-III in Fig. 2.

Fig. 4 is a view in section taken along a line IV-IV in Fig. 1.

As shown in Fig. 1, a riser casing for a pedestal-type hydrant is shown at 10. Casing 10 extends upwardly from a reservoir 12. The reservoir 12 extends only a short distance above ground level or platform level, indicated at 13, while the major portion of the reservoir extends below level 13, the lower part of the reservoir assembly being buried at a sufficient depth to prevent freezing. The reservoir assembly includes mechanism for operating the hydrant, which mechanism is disposed in the lower part of the reservoir below levels to which frost can penetrate. A water supply main 14 feeds potable water into the hydrant structure. The supply main feeds a T-fitting 16 from the side of the reservoir. Fitting 16 is within the reservoir 12 but spaced above the bottom thereof a predetermined distance. One opening of T-fitting 16 is connected to a valve body 17 which contains a slidable valve plug or disc 18, the valve plug being normally held against a valve seat 19 to prevent the flow of water upwardly through the hydrant structure. The other opening of the T-fitting 16 communicates with an ejector supply line 21, which will be described in greater detail hereinafter.

Valve body 17 and valve plug 18 may be of conventional design. Valve body 17 contains a lateral drain port 22 which is uncovered when the valve plug is seated. A riser 23 communicates with valve body 17 and extends upwardly therefrom. Drain port 22 permits water in riser 23 to drain into reservoir 12 when valve plug 18 is seated so that water may not stand and freeze inside riser 23. However, when valve plug 18 is moved upwardly to permit flow of water into riser 23, the valve plug covers drain port 22. Riser 23 conveys water to a hydrant nozzle or spout 24 when the valve is open. Water bypass channels 26 (only one of which is shown) in valve body 17 channel water around valve plug 18 and into riser 23 when the valve is open.

The valve plug 18 may be vertically actuated

in any suitable manner. The valve plug is shown fixed to the lower end of an elongated valve stem 27. The upper end of valve stem 27 carries a stem lift rod 28 surrounded by a compression spring 29. Compression spring 29 constantly bears on a flange 31 which forms a part of lift rod 28, to urge the valve plug toward valve seat 19. The rod 28 extends through a hydrant cap 32. An actuating handle 33 is pivoted to stem rod 28 by means of pivot pin 34. The handle includes a cam 36 which engages the top of hydrant cap 32 when the handle is raised to draw the valve stem upwardly and unseat valve plug 18 permitting water to flow from main 14 through riser 23 to nozzle 24. As shown, nozzle 24 may be equipped with an appropriate coupler 37 which may include a vacuum breaker or check valve 38 (not shown in detail) to prevent drainage of water into the reservoir 12 from a hose or the like when the valve is closed. Packing 39 about head rod 38 is held under compression by a packing gland 40 and spring 29 which constantly bears on packing gland 40.

Nozzle 24 forms a part of a hollow hydrant head casting which is threaded to the upper end of riser tube 23 and fits about casing 19. A casing plug 41 of rubber or other suitable material caps casing 19. If desired, a suitable protective hydrant housing (not shown) may fit about hydrant casing 19.

Each time the hydrant is shut off following use, water in riser 23 drains through port 22 into and accumulates in the lower portion of reservoir 12. To avoid excess accumulation, this riser drainage water is removed from the reservoir when the level of accumulation reaches a predetermined point, by a water ejector indicated generally at 42. The ejector apparatus is controlled by a float 43 in reservoir 12 which rises and falls with the water level in the reservoir.

Within the reservoir 12 is a suction pipe 44 and a riser pipe 45 connected to the suction or intake and the discharge or outlet, respectively, of the ejector 42. Ejector 42 draws water from the bottom of the reservoir 12 and delivers it to the riser pipe 45 from which it is discharged through a spout 45' to drain 45d. The lower end of the suction pipe may be beveled as indicated at 46 so that nearly all of the water will be discharged from the reservoir, thus fixing the lowermost position of the float.

Ejector 42 is started and stopped by a diaphragm valve 47 which is controlled by a valve or cock 48. Valve or cock 48 is actuated by float 43 through a link 49 and lever 50 secured to the plug 51 of the cock 48.

The ejector and float assembly may be compactly arranged in the reservoir by utilizing the suction pipe 44 as a guide for the float. Thus the float may be provided with a tube 52 at its center that extends through the same from top to bottom along the vertical axis of the float, and of such size that the suction pipe will pass freely through the sleeve without binding thereon. The float is therefore maintained in its proper place with relation to the cock actuated by it and may rise and fall freely with changes in water level in the reservoir.

The ejector may be of usual design and includes an upwardly directed nozzle or jet 53 in a chamber 53'. The jet delivers water at high velocity to a Venturi fitting 54 creating a vacuum in chamber 53' whereby drainage water from reservoir 12 is drawn through the suction pipe.

Water is supplied to ejector 42 from main 14 through the T-fitting 16 and the diaphragm

valve 47. Valve 47 comprises a body 54' having a plurality of outlets 55, 56 and 57 respectively, and a diaphragm 58 disposed to close or uncover outlets 56 and 57.

Diaphragm 58 is disposed over a face of the valve body containing the outlets 56 and 57 and clamped at its margin between the body and a housing or cap 59 secured to the body. When the diaphragm is raised off the outlets 56 and 57 water flows from the T-fitting 16 through pipe 21 into the valve body, thence through the outlets 56 and 57 to the ejector 42.

The outlet 57 is provided with a counter-sink or recess 61 in which a ring 62 is disposed and acts as a valve seat. Ring 62 is made of a material such as rubber, either natural or synthetic. We have found that if the diaphragm seats on metal at the outlet 57, the diaphragm is likely to be cut and ultimately punctured by the metal edge of the opening. Ring 62 being of yieldable material prevents cutting and destruction of the diaphragm at this point.

Cock 48 is threaded into outlet 55 and the outlet of the cock is connected by a pipe 63 to the diaphragm housing 59. Plug 51 of the cock has a way 64 therein disposed to register with the inlet and outlet of the cock when in the position shown in Fig. 3. In this position water is supplied from the supply main to the interior of the diaphragm housing whereby the pressure acts on the diaphragm and closes the outlets 56 and 57. The cock and plug are provided with lateral ways 65 and 66 which register when the plug is turned 90 degrees clockwise from the position shown in Fig. 3, whereby water in the diaphragm housing is discharged to drain and pressure on the diaphragm is relieved. When so relieved, the pressure of the water within valve body 54' lifts the diaphragm 58 against the force of a compression spring 67, and the outlets 56 and 57 are uncovered whereby water is delivered to the ejector for the purpose already described herein. The force exerted by spring 67 should be such as to ensure seating of the diaphragm on the outlets 56 and 57 when water pressure from the main act on opposite sides thereof.

When the hydrant is in proper operation, drainage water is discharged from the reservoir 12 through spout 45' each time the float is raised by the water level to the point where the cock plug is turned 90 degrees from the position shown in Fig. 3. If it is observed that no waste water flows out of the spout 45' after repeated use of the hydrant, it will be apparent that the water service ejector device is not functioning properly, indicating that repairs or adjustments should be made.

The operation of the water service fixture will be apparent from the foregoing detailed description and the drawing.

When water is to be supplied from the fixture, an appropriate hose may be attached to coupler 37, after which handle 33 is turned clockwise to a vertical position whereby valve plug 18 is raised off its seat and water flows upwardly through riser pipe 23 to the hose. When the water is to be shut off, handle 33 is returned to its closed position, see Fig. 1. The water in riser 23 drains through drain port 22 into reservoir 12. As the level of water in reservoir 12 builds up, float 43 is raised. The rising movement of the float is transmitted through link 49 and lever 50 whereby the cock plug 51 is turned. The plug 51 is turned more and more as the float rises with accumulation of water in the reservoir until finally the lateral ways 66 and 65 are in communication with the dia-

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phragm housing 59 whereby the water therein is drained and the pressure on the diaphragm relieved. When this occurs, water pressure from the main unseats diaphragm 58 and water flows to the ejector. As the water flows through the ejector, water is withdrawn by it and discharged to drain. As the water level falls in the reservoir, the float descends and when in about the position shown in Fig. 1, the plug 51 is in the position shown in Fig. 3, whereupon water at the pressure in the main is admitted to the diaphragm 58 causing it to seat and close outlets 56 and 57.

The above action is repeated each time the water level rises to a predetermined point in the reservoir. In this manner the riser pipe and reservoir are kept empty, at least to level below the frost line.

In practice I locate valve body 17 at such a distance above the bottom of reservoir 12 that drain port 22 will not be covered by water accumulating in the reservoir.

Having thus described the invention, it will be apparent to those skilled in this particular art that various modifications and changes may be made therein without departing either from the spirit or scope thereof. Therefore what we claim as novel and desire to secure by Letters Patent is:

A valve assembly which comprises a metal valve body having an inlet, a control port and an outlet port communicating with said inlet, said valve body having a flat face surrounding said outlet port, a discharge opening in said face spaced from the outlet port, the discharge opening being countersunk, a hollow annular member of rubber-like material in said countersink and having its outer end flush with the flat face of the valve body, a diaphragm housing attached to the valve body and overlying the discharge opening and the outlet port, a diaphragm in the housing disposed to simultaneously cover and uncover said outlet port and said discharge opening, a three-way valve cock having an inlet port connected to the control port of the valve body, an outlet port connected to the diaphragm housing, and a drain port, a plug in said cock movable to a valve open position in which the outlet port of the cock com-

municates with the drain port and to a valve closed position in which the inlet and outlet ports of the cock are in communication, and a spring in said housing urging the diaphragm into engagement with said flat face, whereby, when fluid under pressure is supplied to the inlet of the valve body and said plug is moved to valve open position, the pressure deflects the diaphragm off the outlet port of the main valve body and fluid flows therethrough to the discharge opening and when said plug is moved to valve closed position, the forces of fluid pressure and said spring act on said diaphragm to deflect it toward the valve body, whereby the diaphragm seats on the annular member and closes the discharge opening.

JAMES W. McGARRY.

BENJAMIN W. WICKEMEIER.

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