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NONFREEZABLE HYDRANT

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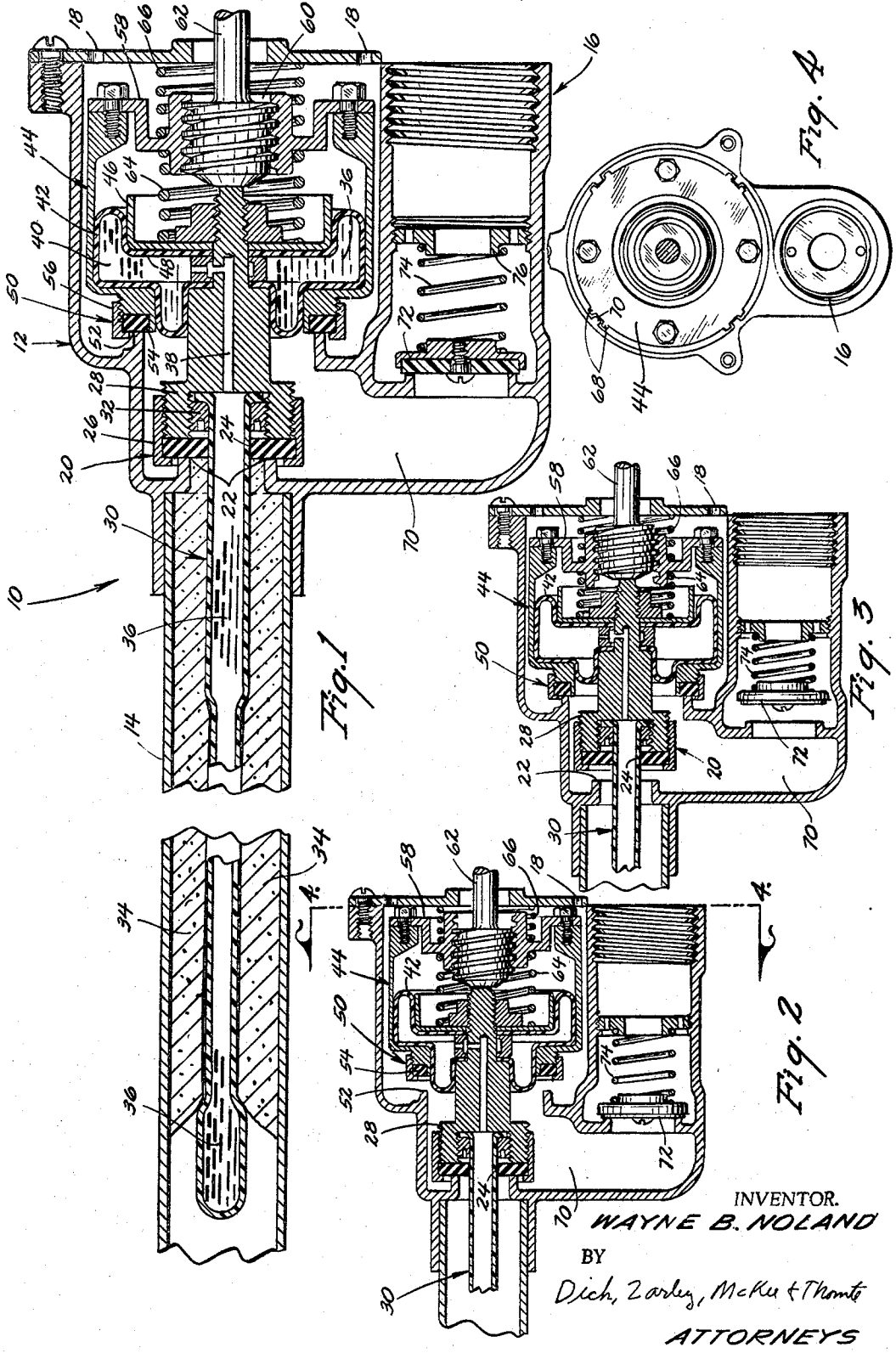


Fig. 1

Fig. 2

Fig. 3

Fig. 4

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NONFREEZABLE HYDRANT

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ABSTRACT OF THE DISCLOSURE

A hydrant having a valve assembly including a pair of valves which may be simultaneously closed or selectively opened such that when the inner or main valve controlling fluid flow through the hydrant is closed, the outer valve may be opened placing the hydrant housing portion downstream from the main valve in communication with the atmosphere thereby enabling drainage of this portion. A bladder is also disposed in the inlet line and is in communication with an expansible reservoir. The bladder and reservoir are filled with a non-freezable fluid and are responsive to opening of the main valve to deflate the bladder whereby a fluid passageway is formed around the bladder in communication with the hydrant outlet.

This invention relates to a valve assembly and in particular to a valve which is in operation responsive to the pressure in the valve inlet.

In hydrants or the like having a series of valves between the inlet and outlet, there is a problem of water contaminating in the area between the valves. This contaminated water may either through absorption enter the inlet water line or upon the hydrant's next use be discharged thereby providing contaminated water to the user.

A further difficulty with conventional valves is that they do not utilize the pressure in the inlet line for actuation of the valve.

A third problem with conventional valves is that they are subject to freezing and therefore become inoperative.

It is therefore one of the principal objects of this invention to provide a valve assembly having a pair of valves which may be simultaneously closed or selectively independently closed such that when the innermost valve is closed the outer valve is open placing the atmosphere in communication with the inner valve and permitting the passageway between the innermost valve and the outlet to be drained and on the other hand when the main valve is opened the outer valve is closed thereby providing a line of flow through the inner valve and out through the outlet.

Another object of this invention is to provide a valve assembly which utilizes the pressures in the inlet line to to actuate the outlet valve.

A still further object of this invention is to provide a valve assembly which is nonfreezable.

A related object of this invention is to provide a nonfreezable valve assembly employing a bladder disposed in the inlet line and filled with non-freezable liquid which upon the bladder being deflated can be transferred to a reservoir cylinder and upon opening the main valve the reservoir cylinder is enlarged to receive additional nonfreezable fluid to form a passageway around the bladder through which liquid in the inlet line may flow to the outlet of the valve assembly.

A further object of this invention is to provide a valve assembly which is simple in design, economical to manufacture and refined in appearance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a fragmentary cross-sectional view of the valve assembly of this invention illustrating the first and second valve units in their closed positions;

FIG. 2 is a reduced in scale fragmentary cross-sectional viek similar to FIG. 1 but showing the second valve unit in its open condition with the first valve unit being closed;

FIG. 3 is a fragmentary cross-sectional view similar to FIG. 2 but showing the second valve unit closed and the first valve unit open whereby material may flow through the valve assembly from the inlet to the outlet; and

FIG. 4 is an end view of the valve assembly taken from the right-hand side of the valve assembly illustrated in FIGS. 2 and 3.

The valve assembly of this invention is referred to generally in the drawings by the reference numeral **10** and includes an outer first housing **12** having an inlet conduit **14** and an outlet conduit **16**. The inside of the housing **12** may be drained through a second outlet comprising a plurality of outlet openings **18**.

A first valve unit **20** is provided and includes a valve seat **22** and a valve element **24**. The valve element **24** is coupled by a keeper **26** to one end of a valve stem **28** disposed in the housing **12**. An elongated elastic bladder **30** is secured by a keeper **32** to the valve stem **28** adjacent the valve element **24**. The bladder **30** extends into the inlet conduit **14** and as illustrated in FIG. 1, is partially deflated by frozen material **34**. The bladder is filled with nonfreezable fluid such as mineral oil **36** which is in communication through a passageway **38** in the valve stem **28** with a reservoir cylinder **40** formed from a diaphragm **42**. The diaphragm **42** is secured to the valve stem **28** and is adapted to bear against the inner end of a cylinder housing **44**. A piston **46** is carried on the valve stem in engagement with the outer wall **48** of the diaphragm **42** for compressing and expanding the cylinder **40**.

A second valve unit **50** is provided which includes a valve seat **52** and a valve element **54** carried on the inner end of the cylinder housing **44**. The valve element **54** is secured by a keeper **56**. The bladder **30**, the valve units **20** and **50** and the valve stem **28** are all coaxially aligned.

The cylinder housing **44** includes an outer wall **58** having a center threaded opening **60** for receiving a threaded handle stem **62** adapted to frictionally engage the outer end of the valve stem **28**. A coil spring **64** is disposed between the piston **46** and the inner side of the wall **58** to yieldably compress the fluid in the cylinder **40**. A second coil spring **66** is disposed between the outer wall of the housing **12** and the outer side of the wall **58** opposite the spring **64** and normally yieldably urges the cylinder housing **44** inwardly such that the valve unit **50** is closed as illustrated in FIG. 1.

The cylinder housing **44** is provided on its outer peripheral sidewall with a pair of ribs **68** which receive therebetween a rib **70** formed on the inside surface of the housing **12** and thereby prevent relative rotation of the valve assembly housing **12** and the cylinder housing **44** and also serve to maintain the two housings and their respective component parts in axial alignment.

The valve assembly is orientated normally as illustrated in FIG. 3 with the outlet **16** below the inlet conduit **14** and thus when the valve unit **20** is open, the fluid flows downwardly into a cavity **70** and upon sufficient pressure in this cavity a check valve **72** is opened for passage of the fluid out through the outlet **16**. The check valve **72** is normally closed by a spring **74** which bears against a retainer wall **76** in the outlet opening.

Thus it is seen in operation that under normal temperature conditions the piston **46** will seek its own level against the action of spring **64**. In FIG. 1, both valve units **20** and **50** are shown closed, but upon turning the handle stem **62** further inwardly the cylinder housing **44** will have to move outwardly thereby opening the valve unit **50** as shown in FIG. 2. Accordingly, the atmosphere may communicate through the inlet openings **18** with the cavity **70** and the area around the valve unit **20** which is closed. Accordingly, contamination of the inside of the housing **12** is prevented and also contamination within the inlet line **14** is prevented. Liquid which would normally collect in the cavity **70** is permitted to drain through the open valve **50** out through the outlet openings **18** when the valve assembly is horizontally oriented.

When it is desired to open the main valve unit **20** the actuating handle stem **62** is moved outwardly permitting the water pressure in the inlet conduit **14** to partially deflate the bladder **30** forcing the liquid therein into the cylinder reservoir **40** and the piston **46** outwardly thereby moving the valve unit **20** to an open position as illustrated in FIG. 3. The accumulated pressure of the liquid in the conduit **14** and the liquid in the bladder **30** and the reservoir cylinder **40** must exceed the pressure of the spring **64**. Once the valve unit **20** is opened as shown in FIG. 3 the water pressure in the cavity **70** will force the check valve **72** to its open position whereby water or the like may be drawn from the outlet **16**.

It is thus seen that the valve assembly **10** utilizes the pressure in the inlet line **14** to open the valve unit **20**.

It is also appreciated that in freezing conditions when ice **34** is formed in the conduit **14** the piston **46** maintains the non-freezable fluid **36** in the bladder **30** under pressure, but when the main valve unit **20** is opened by moving the actuating stem **62** outwardly, the cylinder **40** is enlarged permitting more liquid to enter and thus permitting the bladder **30** to collapse. Partial collapsing of the bladder **30** forms an annular passageway around the bladder through the ice **34**. As the water flows passed the ice **34** it will through friction tend to melt it and eventually all ice will be removed even at sub-freezing temperatures.

What is claimed is:

1. A valve assembly, comprising,

an assembly housing having an inlet and an outlet and a passageway connecting said inlet and outlet,

a valve unit disposed in said passageway and including a valve seat and a removable valve element, and

actuating means for moving said valve element between open and closed positions,

said actuating means includes a collapsible bladder in said inlet, said bladder being filled with a non compressible fluid and in fluid communication with an expansible chamber defined by a cylinder having a piston therein, said piston being connected by means to said valve element for movement therewith whereby pressure on the exterior of said bladder tends to move said valve element to said open position,

said means connecting said valve element to said piston includes a valve stem and said cylinder includes one wall defined by a flexible diaphragm, said piston being connected to said diaphragm,

a second outlet adapted to communicate with said inlet through said valve unit, a second valve unit having a valve seat and valve element adapted to open and close said second outlet, a movable cylinder housing connected to said second valve element for movement therewith in said second valve unit, said cylinder and piston movably disposed in said cylinder housing, yieldable means for moving said cylinder housing and said second valve element to a closed position engaging said second valve seat, adjustable means movably interconnecting said cylinder housing to said valve stem for moving said valve stem and said cylinder housing in opposite directions whereby said first and second valve units may be simultaneously closed at times and said first valve unit closed and said second valve unit opened at other times.

2. The structure of claim **1** and said bladder and cylinder are filled with nonfreezable fluid.

3. The structure of claim **1** and a spring means in said cylinder housing between said piston and the outer end of said cylinder housing for normally urging said piston inwardly of said cylinder and thereby force material in said cylinder into said bladder.

4. The structure of claim **3** and said bladder is connected to said valve stem and said valve stem is provided with a passageway in fluid communication with said cylinder.

5. The structure of claim **1** and said first and second valve units, said valve stem and said movable cylinder housing are axially aligned.

6. The structure of claim **5** wherein said adjustable means includes threads, and means is provided for limiting rotation between said first and second housings.

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