United States Patent [19]

Murdock et al.

[11] **3,770,000**

[45] **Nov. 6, 1973**

[54] **SANITARY FROSTPROOF HYDRANT**

[75] Inventors: **Joseph Kelso Murdock; Eugene J. Riddle,** both of Cincinnati, Ohio

[73] Assignee: **Murdock Inc.,** Cincinnati, Ohio

[22] Filed: **Dec. 23, 1968**

[21] Appl. No.: **786,148**

[52] **U.S. Cl.** **137/217,** 92/245, 137/218, 137/281, 251/75

[51] **Int. Cl.** **E03b 9/14,** E03c 1/10

[58] **Field of Search** 251/75; 92/245; 137/281, 218; 74/97, 100

[56] **References Cited**

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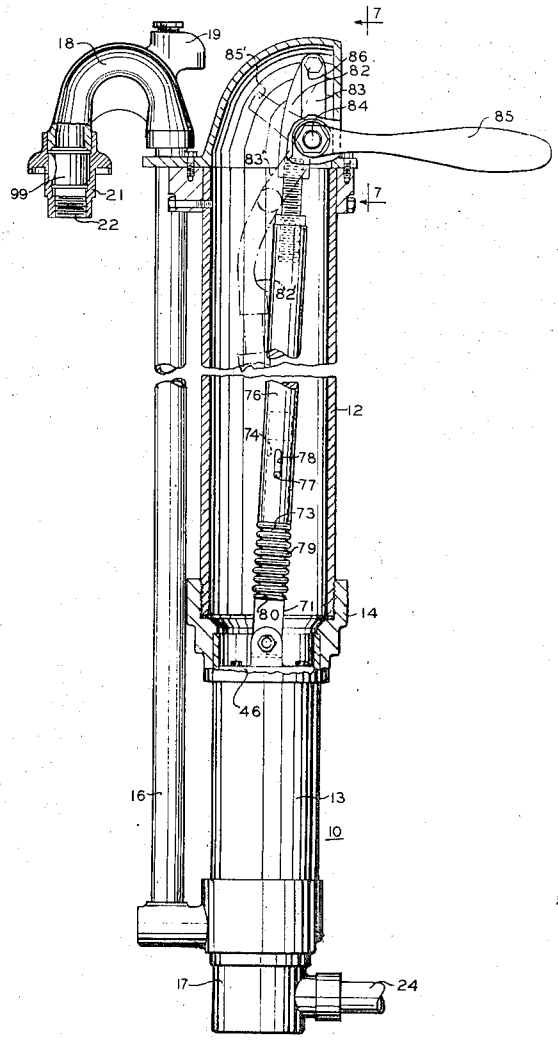
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Assistant Examiner—Richard Gerard
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[57] **ABSTRACT**

A sanitary and frostproof hydrant which includes a cylindical housing having a valve controlled inlet opening at one end and a riser communicating with the interior of the housing at that end. A piston moves in the cylinder between a valve open position engaging the valve to open it and a water storage position spaced from said end of the cylinder in which riser water is stored in the cylinder.

4 Claims, 9 Drawing Figures



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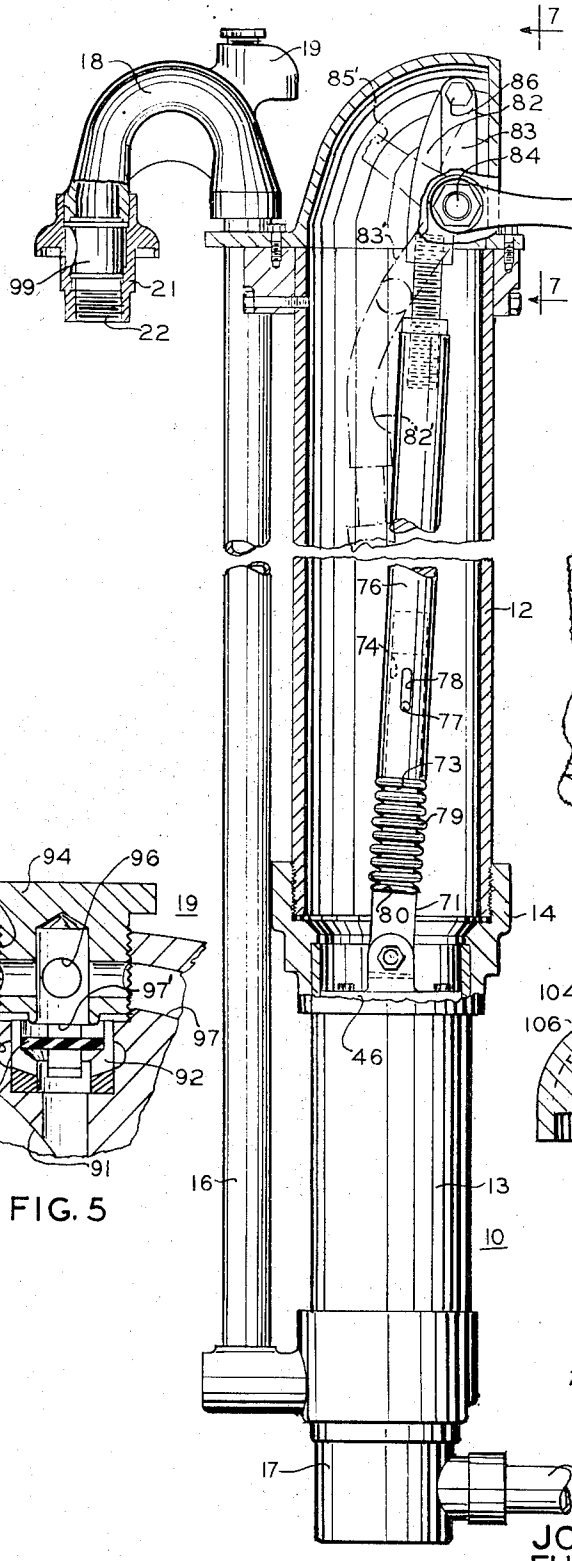


FIG. 1

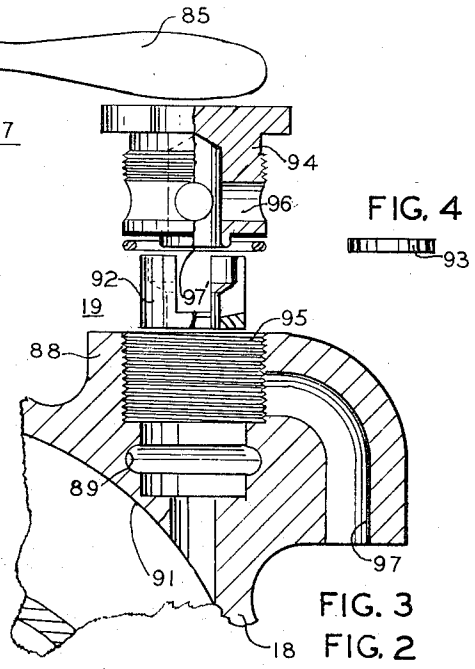
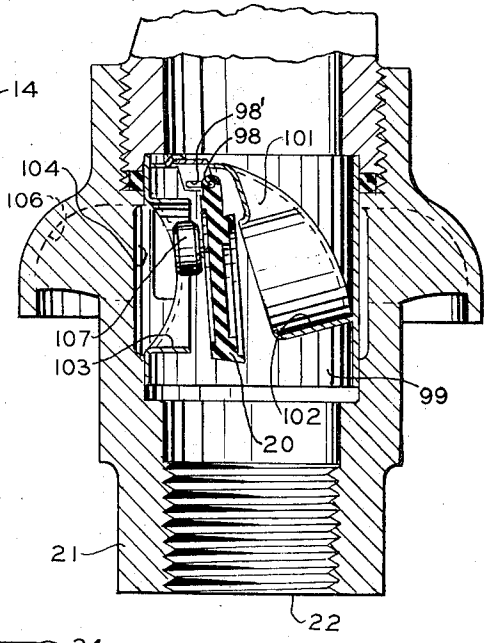


FIG. 4

FIG. 3

FIG. 2

FIG. 5



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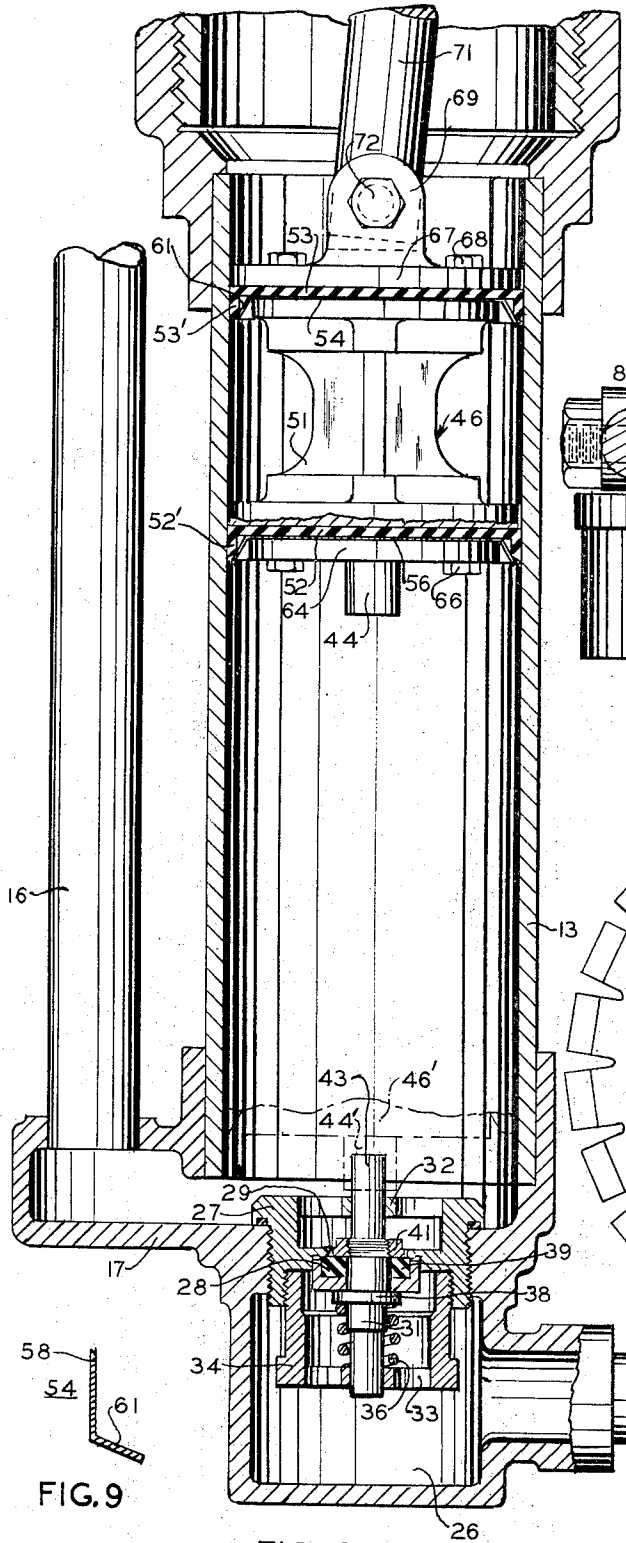


FIG. 6

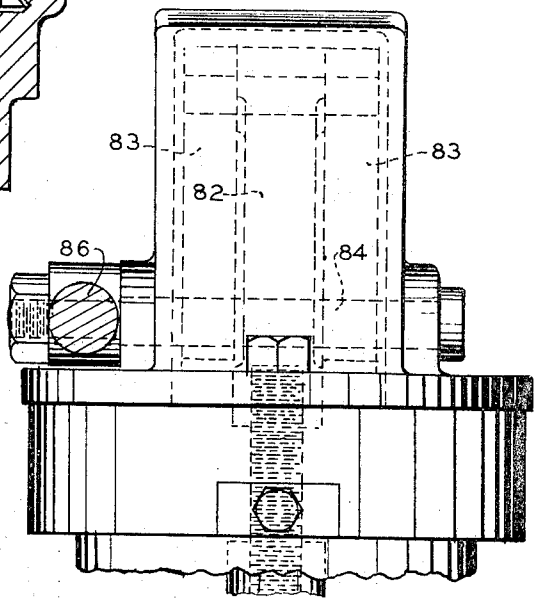


FIG. 7

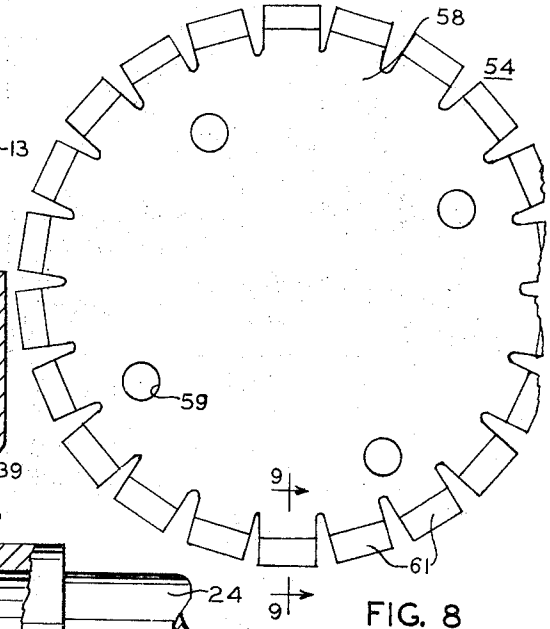


FIG. 8

FIG. 9

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SANITARY FROSTPROOF HYDRANT

This invention relates to non-freezing and pollution-proof hydrants and more particularly relates to a hydrant for supplying potable water in railroad yards or other exposed locations where freezing weather conditions are encountered.

Hydrants used for supplying potable water to railroad cars and the like may be exposed to freezing temperatures during winter weather. Water mains and valves may be located in the ground below levels to which frost can penetrate, but the water must be led from the buried main to above ground level through a riser exposed to freezing temperatures, and an object of this invention is to provide a hydrant having a storage space below frost line to which water remaining in the riser after each use is automatically transferred and stored without danger of pollution when the hydrant is shut off.

A further object of this invention is to provide a hydrant in which riser water is stored below frost line without danger of pollution.

A further object of this invention is to provide a hydrant having valve mechanism which includes a displacement member or piston that is displaced to make room for riser water when the hydrant is turned off.

Briefly, this invention provides a hydrant having a chamber in which riser water is stored when the hydrant is not in use having a piston therein which can be moved in one direction to draw riser water into the chamber and in a reverse direction to return the riser water to the riser. A valve at one end of the chamber is operated by the piston when the piston is in chamber empty position. A piston rod which operates the piston is provided with a resilient lost motion connection which permits opening of the valve without water hammer. The structure represents an improvement over what is shown in U.S. Pat. No. 2,630,130 of Joseph Kelso Murdock and Eugene Le Roy.

The above and other objects and features of the invention will be apparent to those skilled in the art to which this invention pertains from the following detailed description and the drawings in which:

FIG. 1 is a view in side elevation of a sanitary and frostproof hydrant constructed in accordance with an embodiment of this invention, parts thereof being broken away and in section to reveal details of construction, a lowered position of linkage thereof being shown in dot-dash lines;

FIG. 2 is a view in upright section on an enlarged scale of a discharge portion thereof;

FIG. 3 is an exploded view in section on an enlarged scale of a vacuum breaker which forms a part of the hydrant;

FIG. 4 is a view in side elevation of a valve disc which forms a part of the vacuum breaker shown in FIG. 3;

FIG. 5 is a view in upright section of the vacuum breaker illustrated in FIG. 3;

FIG. 6 is a view in upright section on an enlarged scale of the lower portion of the hydrant, a lowered position of a piston thereof being shown in dot-dash lines;

FIG. 7 is a fragmentary view in section taken on an enlarged scale on the line 7—7 in FIG. 1;

FIG. 8 is a plan view of a cup spreading spring member which forms a part of the hydrant; and

FIG. 9 is a view in section taken on the line 9—9 in FIG. 8.

In the following detailed description and the drawings, like reference characters indicate like parts.

In FIG. 1 is shown a sanitary and frostproof hydrant 10 constructed in accordance with an embodiment of this invention. The hydrant 10 includes a hollow upright main casing 12 and a cylindrical lower chamber or housing 13 which are connected by a cylinder top fitting 14. The hydrant can be mounted in the ground (not shown) with the cylindrical lower chamber 13 thereof sufficiently deep in the ground to be located below frost level. A riser 16 connects with the lower end of the cylindrical lower chamber 13 through a hollow valve housing 17. At the top of the riser 16 is mounted an outlet head 18 provided with an air check valve 19 mounted near the top thereof and a swinging water check valve 20 (FIG. 2) mounted in a housing 21 having a downwardly directed discharge end portion 22. The swinging check valve 20 prevents back flow of water from a hose or the like (not shown) which can be attached to the housing 21 at the discharge end portion 22. The air check valve 19 and the swinging water check valve 20 will be described in greater detail hereinafter.

Water is supplied to the hydrant through a main 24 (FIG. 1) which communicates with an inlet chamber 26 (FIG. 6) in the lower portion of the valve housing 17. A valve seat member 27 is mounted in the housing 17 above the chamber 26. A valve disc 28 normally closes a valve seat 29 in the valve seat member 27. The valve disc 28 is carried by a double ended valve stem 31. The stem 31 is guided by an upper spider 32, which is a part of the valve seat member 27, and by a lower spider 33, which is a part of a cage member 34 attached to the valve seat member 27. A compression spring 36 engages the lower spider 33 and also engages a collar 38 on the stem to urge the valve stem and the valve disc to valve closed position. Pressure of water in main also urges the valve disc and the valve stem to valve closed position. The valve disc 28 is supported by a cup member 39 which is mounted on the stem 31 overlying the collar 38. A nut 41 threaded on the stem 31 holds the valve disc in position thereon. An upper stem portion 43 extends upwardly into the cylindrical lower chamber 13 and can be engaged by a lug 44 which is mounted on a piston 46.

The piston 46 is movable inside the chamber 13 between a raised position shown in full lines and a lowered position shown in dot-dash lines at 46' at which the lug (indicated at 44') is in position to engage the upper stem portion 43 to advance the valve stem 31 and the valve disc 28 downwardly to open the valve so that water can flow from the main 24 through the valve into the lower end of the riser 16 to be discharged therethrough. When the piston 46 is raised from the dot-dash line position to the full line position, the valve stem is released to permit the valve to close under the action of the spring 36 and of water pressure in the main 24. Further, as the piston 46 is raised, riser water is drawn from the riser into the lower end of the cylindrical chamber 13 to be stored therein below frost level.

The piston 46 includes a body 51 at ends of which are mounted cup-shaped resilient gaskets 52 and 53 of rubber or other rubber-like material. Flanges or lips 52' and 53' of the gaskets 52 and 53, respectively, are supported by spring metal cup expanders 56 and 54, respectively. Details of construction of the expander 54

are shown in FIGS. 8 and 9, the other expander being of similar construction. The expander 54 is formed of spring metal and includes a flat body 58 provided with bolt holes 59 therein and a plurality of teeth 61 extending outwardly and away from the plane of the body 58, as shown in FIG. 9. As shown in FIG. 6, the teeth 61 engage the lip 53' of the cup 53 to hold the lip firmly in engagement with walls of the chamber 13. The gasket 52 and the expander 56 are held in assembled relation with the piston body 51 by a plate 64 (FIG. 6) attached thereto to bolts 66. The plate 64 carries the lug 44. The gasket 53 and the expander 54 are held in assembled relation with the piston body 51 by a plate 67 attached thereto by bolts 68. The plate 67 carries spaced lugs 69, only one of which is shown, between which a lower end of a lower rod 71 is pivotally mounted upon a pivot pin 72, which is carried by the lugs 69. As shown in FIG. 1, an upper end portion 73 of the rod 71 is telescopically received inside a lengthwise socket 74 in a lower end portion of an upper rod 76. A transverse pin 77 is mounted in the upper end portion 73 and extends outwardly of the rod 71 through slots spring only one of which is shown, in the wall of the socket 74 of the rod 76. A compression pring 79 mounted on the rod 71 and engaging the lower end of the rod 76 and a shoulder 80 on the rod 71 urges the rods 71 and 76 to the extended position shown in FIG. 1. When the rod 76 is advanced downwardly, the spring 79 is compressed and the rod 76 travels telescopically of the rod 71 until the pin 77 is engaged by upper ends of the slots 78 or until spring pressure is sufficient to overcome valve closing forces, whereupon the valve stem 31 is advanced downwardly rapidly by action of the spring 79 without there being vibration or water hammer as the valve opens.

The upper rod 76 carries a head 82 (FIG. 1) which is pivotally connected by a pivot 86 to cranks 83. The cranks 83 are carried by a shaft 84 which also carries a handle 85. When the handle 85 is swung from the full line position to the dot-dash line position indicated at 85', the rods 76 and 71 and the piston 46 are advanced downwardly from the full line position to the position at which the piston is shown in dot-dash lines at 46' in FIG. 6, the position of the cranks being shown at 83' and of the head of the upper rod at 82' in FIG. 1.

Details of construction of the air check valve 19 at the upper end of the riser 16 are shown in FIGS. 3, 4, and 5. The air check valve permits air to enter the upper end of the riser as the piston moves downwardly to draw water from the riser. The air check valve includes a body 88 (FIG. 3) which is integral with the outlet head 18. A socket 89 in the body 88 communicates with a passageway 91 in the outlet head 18 through which riser water is discharged from the riser 16. A cage-like disc holder 92 is mounted in the socket 89 and supports a disc 93 (FIGS. 4 and 5). A channeled plug 94 is received in a threaded counterbored portion 95 (FIG. 3) of the socket 89 overlying the disc holder 92, as shown in FIG. 5. Channels 96 in the plug communicate through a channel 97 in the body 88 with air outside the hydrant. When there is pressure of water inside the passageway 91, the valve disc rises against an annular seat 97' on the plug to close the air check valve.

The water check valve 20 (FIG. 2) prevents the drawing of water into the riser from a hose or the like (not shown) attached to the discharge end portion 22 of the housing 21. The valve 20 is pivotally mounted on a pivot pin 98 which is carried in horizontal slots 98', only one of which is shown, in a generally sleeve-like member 99 mounted inside the housing 21. A baffle 101 is mounted inside the sleeve member 99 and extends transversely thereof, there being an opening 102 therethrough. The valve can swing to the right as shown in FIG. 2 to close the opening 102 in the event of water flow upwardly through the housing 22. An opening 103 in the sleeve member 99 permits outward flow of water through a circumferential channel 104 and radial channels 106 in the housing to be discharged downwardly therefrom. On the other hand, when water flows downwardly through the housing 21, the valve 20 swings and moves to the left to close the opening 103. A weight 107 is mounted on the valve 20 so that it normally hangs between the openings.

The hydrant structure illustrated in the drawings and described above is subject to structural modification without departing from the spirit and scope of the appended claims.

Having described our invention, what we claim as new and desire to secure by letters patent is:

1. A sanitary and frostproof hydrant which comprises an outlet head having a water conducting passage therein, a return water overflow port in the side of said passage adjacent the discharge end thereof, an enlongated cylindrical housing having an inlet opening at one end thereof, a valve member for closing said opening, a riser communicating with the interior of the housing adjacent said housing end and the water conducting passage in said outlet head, a piston in fluid tight relation with the interior of the housing, means on the piston engageable with the valve member to open the valve when the piston is in a valve open position adjacent said end of the housing, means for advancing the piston along the housing between the valve open position and water storage position spaced from said end of the cylinder in which riser water is stored in the cylinder, the means for advancing the piston along the housing including a piston rod including a pair of telescopically engaged sections and spring means urging the sections to an extended position, the sections moving to a retracted position against the bias of the spring means as the piston is moved in valve opening direction into engagement with the valve member, the bias of the spring means being sufficient to cause the sections to move to extended position as the valve opens so that the valve opens quickly, said outlet head having a double acting check valve adjacent the discharge end of said water conducting passage therein and seatable to close said return water overflow port in the side of said passage while water is discharged through the outlet head and seatable to close the said passage upstream of the overflow port to divert return water through the overflow port and an air check valve to vent said outlet head water conducting passage to the atmosphere intermediate said riser and said double acting check valve only when water is not being discharged from said hydrant so that upon movement of said piston to water storage position, water does not stand in a portion of the riser wherein it might be frozen.

2. A sanitary and frostproof hydrant which comprises an outlet head having a water conducting passage therein, a return water overflow port in the side of said passage adjacent the discharge end thereof, an elongated cylindrical housing having an inlet opening at one

end thereof, a valve member for closing said opening, a riser communicating with the interior of the housing adjacent said housing end and the water conducting passage in said outlet head, a piston in fluid tight relation with the interior of the housing, the piston including a body, a pair of cup-shaped gaskets each attached in sealing relation to a respective end of the body with a flange of each gasket in flatwise face-to-face engagement with the interior wall of the housing, and a cup-expander of resilient material attached to the body inside each cup-shaped gasket, each cup-expander including a plurality of outwardly extending teeth resiliently engaging the flange of the gasket associated therewith to hold the flange in sealing engagement with the wall of the housing, the gaskets supporting the piston in substantial alignment in the housing when cantedly directed forces are applied thereto by said piston advancing means and providing tandem seals between the ends of the piston, means on the piston engageable with the valve member to open the valve when the piston is in a valve open position adjacent said end of the housing, means for advancing the piston along the housing between the valve open position and water storage position spaced from said end of the cylinder in which riser water is stored in the cylinder, said outlet head having a double acting check valve adjacent the discharge end of said water conducting passage therein and seatable to close said return water overflow port in the side of said passage while water is discharged through the outlet head and seatable to close the said passage upstream of the overflow port to divert return water through the overflow port and an air check valve to vent said outlet head water conducting passage to the atmosphere intermediate said riser and said double acting check valve only when water is not being discharged from said hydrant so that upon movement of said piston to water storage position, water does not stand in a portion of the riser wherein it might be frozen.

3. A sanitary and frostproof hydrant which comprises an elongated cylindrical housing having an inlet opening at one end thereof, a valve member for closing said opening, a riser communicating with the interior of the housing adjacent said end, a piston in fluid tight relation with the interior of the housing, means on the piston engageable with the valve member to open the valve when the piston is in a valve open position adjacent said end of the housing, and means for advancing the piston along the housing between the valve open position and a water storage position spaced from said end of the cylinder in which riser water is stored in the cylinder, which piston advancing means includes a piston rod including a pair of telescopically engaged sections and spring means urging the sections to an extended position, the sections moving to a retracted position against the bias of the spring means as the piston is moved in valve opening direction into engagement with the valve member, the bias of the spring means being sufficient to cause the sections to move to extended position as the valve opens so that the valve opens quickly.

4. A sanitary and frostproof hydrant as in claim 3 wherein the piston includes a body, a pair of cup-shaped gaskets each attached in sealing relation to a respective end of the body with a flange of each gasket in flatwise face-to-face engagement with the interior wall of the housing, and a cup-expander of resilient material attached to the body inside each cup-shaped gasket, each cup-expander including a plurality of outwardly extending teeth resiliently engaging the flange of the gasket associated therewith to hold the flange in sealing engagement with the wall of the housing, the gaskets supporting the piston in substantial alignment in the housing when cantedly directly forces are applied thereto by said piston advancing means and providing tendem seals between the ends of the piston.

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