Nov. 24, 1964 H. A. TUBBS 3,158,170

YARD HYDRANT

Filed March 7, 1961

Fig. 2.

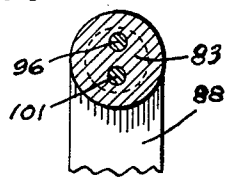


Fig. 1.

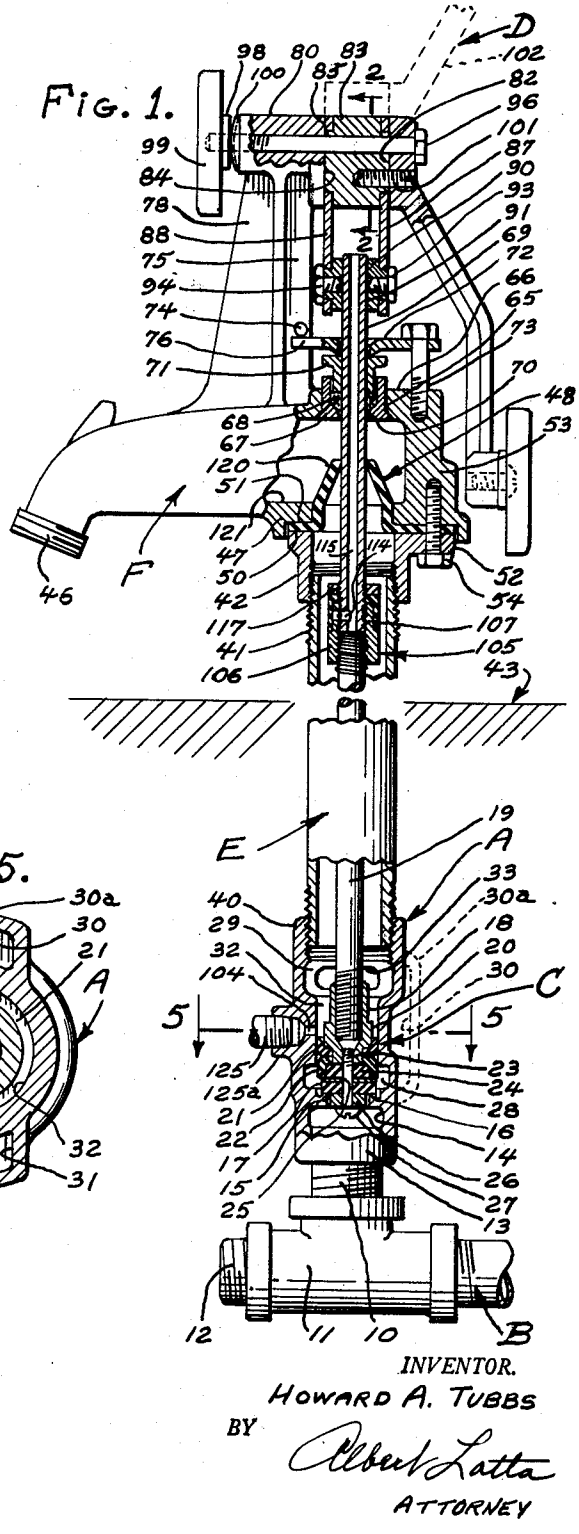


Fig. 3.

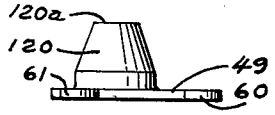


Fig. 4.

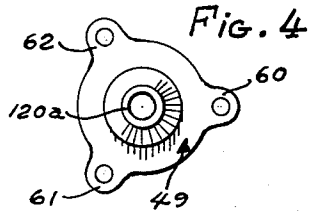
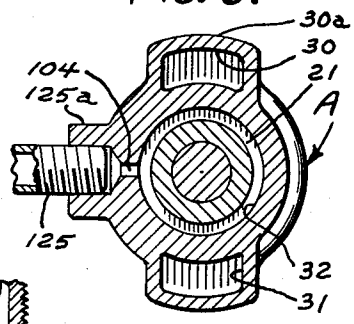


Fig. 5.



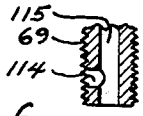
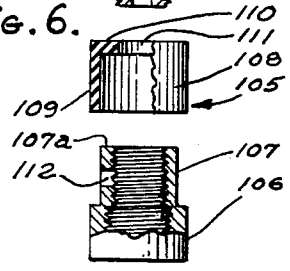


Fig. 6.



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3,158,170
YARD HYDRANT

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The invention relates to a water hydrant commonly referred to as a yard hydrant.

Such a hydrant is used in conjunction with an underground water supply pipe wherein an underground valve controls the supply of water from the supply pipe, such valve being operable from above ground level. In a hydrant of this type a problem arises in connection with the drainage of water trapped in the hydrant above the main valve when such valve is turned off.

The general object of the invention, then, is to provide apparatus for handling the water drainage problem.

A specific object is to provide a valve for preventing siphoning action during water drainage.

A further object is to provide an auxiliary valve for eliminating a vacuum condition occasioned as a result of the functioning of the non-siphoning valve.

A further object is to provide a water hydrant in which separable castings at one of the valve assemblies affords repair and maintenance advantages.

Other objects and advantages of the invention will be apparent from the ensuing specification and appended drawing in which:

FIG. 1 is a side elevational view, partly in section of the yard hydrant.

FIG. 2 is a fragmentary sectional detail view taken on the line 2—2 of FIG. 1.

FIG. 3 is a side elevational detail view of the non-siphoning valve.

FIG. 4 is a plan view of the valve shown in FIG. 3.

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 1.

FIG. 6 is an exploded view showing the details of the air vent valve mechanism.

In general, the yard hydrant includes a water inlet casting A having its interior in communication with the underground water supply pipe B. The main shut-off valve C is operable from above ground level by means of the hand crank D. When the valve is opened, the water travels up through the feed pipe E from whence it is then discharged out through the spout F as needed.

The water inlet casting A has its lower end threaded onto a nipple 10 which is threaded into T 11 into which the water supply pipe B is threaded.

I have shown one end of the T closed off by threaded plug 12, however, it will be understood that the water supply pipe B could continue underground for supplying several hydrants and it will be further understood that a supply of pressurized water is constantly present within the supply pipe. The source of supply of the pressurized water could be a municipal water system or other rural type of water pumping system available commercially but not shown herein.

The lower end 13 of the water inlet casting has a water reception chamber 14 communicating with bore 15 which provides valve seat 16 against which the valve member 17 seats.

The overall valve assembly C includes the valve plunger body 18 which is threaded onto the lower end of the valve operating rod 19. The plunger has a diametrically enlarged cylindrical portion 20 providing an annular shoulder at its underside against which the base portion of the annular valve cup 21 abuts. A second valve cup 22 is also mounted on the reduced cylindrical end portion 23 of the plunger body. A cushioning washer member 24 serves as a backing for the second valve cup and a rigid washer 25 is interposed between member 24 and

valve 17. A backing washer 26 is engaged by the head of the screw 27 which is threaded into the plunger body for anchoring the entire valve assembly relative thereto. The construction of the valve assembly C is conventional and hence is not shown in any greater detail than is disclosed in FIG. 1.

The water chamber 28 communicates with the water chamber 29 via the water passages 30 and 31 which are formed in the casting A. These water passages are laterally offset from the central casting bore 32, as shown best in FIG. 5, and circumvent such bore. The upper end of passage 30 has a mouth 33 which opens into the water chamber 29. The water passage 31 would, of course, open into the chamber 29 in the same manner. In FIG. 1 I have shown in dotted lines the laterally offset boss 30*a* rotated 90 degrees out of its normal position (which appears in FIG. 5).

Threaded into the upper end of the water inlet casting is the water feed pipe E, the upper end 41 of which is threaded into a separate casting 42.

It will be understood that the lower end of the feed pipe E together with the water inlet casting and the water supply pipe B are situated sufficiently far underground as to be below frost depth. For explanatory purposes, ground level has been indicated at 43 in FIG. 1. The upper end 41 of the water feed pipe will extend above ground level several inches so that the threaded nose portion 46 of the spout F would be readily available for a water hose or other water handling conduit that might be fastened thereto.

The spout F is in the form of a casting which includes the body portion 47 which is secured to the upper end of the casting 42. The valve member 48 which is formed of rubber or some similar material has a flange portion 49 interposed between the upper surface 50 of casting 42 and the undersurface 51 of the spout casting for assuring a water tight joint between such castings. Each of such castings may be provided with outwardly projecting boss portions 52 and 53 and the bolts 54 anchor the two castings together. Each of such castings may have a total of three such bosses, equally circumferentially spaced from each other, only one set of such bosses being shown in FIG. 1.

The valve flange 49 is provided with three radially outwardly projecting apertured ears 60, 61 and 62 through which the bolts 54 project. The valve flange ears are, of course, registered with the respective casting bosses. By using a separable casting 42 and a valve member 48 having a flange portion 49 which serves as a gasket, the spout casting (after loosening bolts 93 and 94) can be readily detached from casting 42 for servicing the interior of the feed pipe E. That is, the main shut-off valve C and the rods 19 and 69 to which it is attached, can be readily withdrawn out of the feed pipe for servicing.

An opening 65 is provided in the upper wall 66 of the spout body and a bushing 67 is fixedly mounted in such opening. An annular packing gland 68 encircles the rod 69 which projects through the bushing opening 70. The packing 68, of course, prevents escape of water from the spout body. Axial pressure is exerted on the packing gland 68 by means of bushing 71 against which tension is exerted by the fulcrum arm 72. The arm 72 has one of its ends bolted by means of bolt 73 through the spout body and its other end received under the pin 74. The pin extends outwardly on each side of the rib 75 (only one end of such pin being shown in FIG. 1) and the end 76 of the fulcrum arm 72 is bifurcated (not shown) so as to have one leg on each side of the rib 75.

The rib 75 is integral with the spout casting and is part of the upwardly projecting support pillar 78.

At the upper end of the support pillar a boss 80 is

formed having a central bore therethrough. The hand crank D is secured to the end face 82 of the eccentric 83 and the opposite end face 84 of the eccentric bears against the end wall 85 of the boss 80.

The eccentric has diametrically reduced cylindrical end portions projecting through suitable bores in the link members 87 and 88 and the lower ends of such link members are likewise provided with suitable bores for mounting on the diametrically reduced cylindrical end bearing portions of the cross head 90. The cross head has a diametric bore 91 therethrough into which the upper end of rod 69 extends. The cross head is anchored to the rod by means of the set screws 93 and 94, the heads of which prevent the link members from coming off of the bearing portions of the cross head.

A bolt 96 extends through the crank handle and through the eccentric and on through the boss 80 and is threaded into the hub portion 98 of hand wheel 99. A Belleville type washer 100 is inserted between the end wall of boss 80 and the hand wheel hub 98 so as to impose axial thrust on the bolt 96 for resiliently holding the end of the eccentric against the end wall of boss 80 and serving as a variable compression crank handle lock.

A set screw 101 anchors the end of the crank D to the eccentric and when the crank is rotated about the axis to bolt 96 to the position as shown at 102 in dotted lines in FIG. 1, then the rod 69 and rod 19 are pulled upwardly in order to unseat the valve 17 from the valve seat 16. It will be understood that the link members accommodate the lateral movement occasioned by the rotation of the eccentric (in the manner of a crank and pitman arm arrangement) so that rectilinear movement is appropriately imparted to the rods 19 and 69. When the valve assembly C is opened, the water drainage outlet 104 is closed off by the valve cups 21 and 22 preventing escape of the pressurized water when the hydrant is in use.

The valve assembly identified generally by the numeral 105 includes a body member 106 which is threaded onto the upper end of the operating rod 19 and which has a diametrically reduced end portion 107 of cylindrical cross-section, the external wall of which serves as a valve seat. A flexible valve cup 108 formed of rubber or some similar material includes a cylindrical annular flange portion 109 and a radially inwardly directed base portion 110. The base has a central opening 111 through which the rod 69 projects. The annular flange portion 109 encircles valve body portion 107 and normally closes off the air opening 112 which registers with the opening 114 in the rod 69. The openings 112 and 114 are constantly exposed to atmosphere through the rod bore 115 which opens to atmoshpere. The upper end of rod 19 closes off the lower end of bore 115.

When the pressure conditions within feed pipe E are such as to exceed atmospheric pressure (such as when the hydrant is in use), then the internal wall of valve flange 109 hugs the cylindrical valve seat 107 and closes off communication between the interior of the feed pipe and atmosphere. A backing nut 117 is threaded onto the lower end of rod 69 for anchoring the base portion of the valve cup against the end wall 107*a* of the valve body 106. The Durometer reading of the valve members 48 and 108 is in the area between 45 and 65 in order to assure the desired flexibility for the proper functioning of such valve members.

Operation

Assuming that the valve 17 is closed against the valve seat 16, then the water pressure within the supply pipe B is present within the valve body chamber 14. Upon opening the valve 17 by swinging crank D to the position as shown in dotted lines in FIG. 1, the pressurized water travels into the chamber 28 thence through passages 30 and 31 into chamber 29 and then up through the interior of the feed pipe E against the underside of the valve cup 48. The water pressure exerted on the underside of the valve cup causes expansion of the conical nose portion 120 permitting the water to travel into the spout interior chamber 121 and thence out of the spout for any intended usage. The threaded end portion 46 of the spout is adapted for receiving the connecting end of a suitable hose to distribute the water for watever purpose needed.

When the valve 17 is closed against valve seat 16, the water pressure within feed pipe E is cut off and the water drainage opening 104, as shown in FIG. 1, is in communication with the bore 32 and with the interior of the feed pipe E for draining the water which is trapped in the feed pipe between the valves 48 and C. A drainage pipe 125 may be threaded into the outer end of the boss 125*a* and it may lead to a suitable underground drainage bed, such as a gravel bed of suitable size and capacity. Upon the drop of the water pressure within the feed pipe, the annular apertured lip 120*a* of the conical nose portion 120 of the valve 48 hugs the cylindrical external wall of rod 69 (which serves as the valve seat) sufficiently tight as to close off the interior of the feed pipe from the interior of spout F so as to prevent any siphoning action which would otherwise draw the water within the spout F (and the hose connected thereto) down through the feed pipe to the drain opening 104. The valve 48, by preventing this siphoning action, thereby prevents an otherwise unduly large amount of water being discharged through the discharge pipe 125. Thus the only quantity of water which is drained or discharged through pipe 125 is that quantity which was trapped within the feed pipe E.

When the valve 48 closes against the external wall of the rod 69, the water within pipe E recedes downwardly as a result of gravity and a vacuum condition above the level of the receding water would be created and would tend to impede and eventually stop such drainage were it not for the action of the valve 108. When a sub-atmospheric pressure condition is set up within the feed pipe E above the level of the receding water, then the atmospheric pressure present at the opening 112 is sufficient to expand the annular valve flange 109 enough to permit air to enter the interior of the feed pipe, thereby maintaining the air column within the feed pipe above the water at approximately atmospheric pressure. Thus the complete drainage of the water out of the feed pipe E by the action of gravity is assured.

It will be understood that when the valve C is opened again, the water pressure within the feed pipe E is greater than the atmospheric pressure at opening 112 and thence the internal wall of the valve flange 109 hugs the external wall of the valve body portion 107 sufficiently tight as to prevent the water inside of feed pipe E from escaping out through the rod bore 115. While I have shown the valve flange 109 directed downwardly, it will be understood that such flange could be inverted so as to be directed upwardly. In such case the peripheral edge of the flange would be exposed upwardly and hence more susceptible to the introduction of sediment therebehind, during the period of water drainage from within feed pipe E. It would, however, be less susceptible to the tendency of water getting behind the flange while surging up through the feed pipe E after valve C is opened.

I claim:

1. A water hydrant for use with an underground water supply pipe comprising: a hollow casing extending below ground level and having a water inlet in communication with the interior of the water supply pipe; a first valve within the casing beneath ground level for controlling the opening and closing of the water inlet; a water drainage outlet in communication with the interior of the casing and situated below ground level; a water dispensing housing situated above ground level and having its interior in communication with the interior of the hollow casing; a rod extending through the casing and being connected to the first valve; a second valve actuated by the rod for opening and closing the water drainage outlet with reference to the interior of the casing; a third valve within the housing for closing off communication between the inte-

rior of the housing and the interior of the casing to prevent return flow of the water; said rod having a passage opening to atmosphere and also opening to the interior of the casing between the third valve and drainage outlet and a fourth valve for controlling the opening and closing of such passage into or out of communication with the interior of the casing.

2. A water hydrant as set forth in claim 1 wherein the fourth valve is of resilient material encircling the rod and normally closing off the rod passage.

3. A water hydrant comprising: a hollow casing extending below ground level and having a water inlet in communication with an underground source of pressurized water; a first valve within the casing beneath ground level for controlling the opening and closing of the water inlet; a rod extending interiorly of and through the casing and operable above ground level for effecting the opening and closing of the first valve; a water dispensing housing having its interior in communication with the interior of the hollow casing, said water dispensing housing being in the form of a casting having an opening at its underside and a gasket seating surface surrounding the opening; a hollow casting secured to the upper end of the casing and having a gasket seating surface at its upperside; a second valve formed of flexible material and having a hollow portion encircling the rod and coacting therewith for automatically closing off the route with reference to the traveling of the water in return direction from the water dispensing housing, said second valve also having a flange portion integral with the hollow portion and serving as a gasket and being interposed between the gasket seating surfaces of the castings; fastening means for removably securing the castings together; a water drainage outlet in communication with the interior of the casing and situated below ground level; a third valve actuated by the rod for controlling opening and closing of the water drainage outlet; the hollow casing and the interior of the dispensing housing establishing a water route from the underground source of pressurized water.

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