United States Patent

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[54] HYDRANT PURGING MEANS
5 Claims, 8 Drawing Figs.

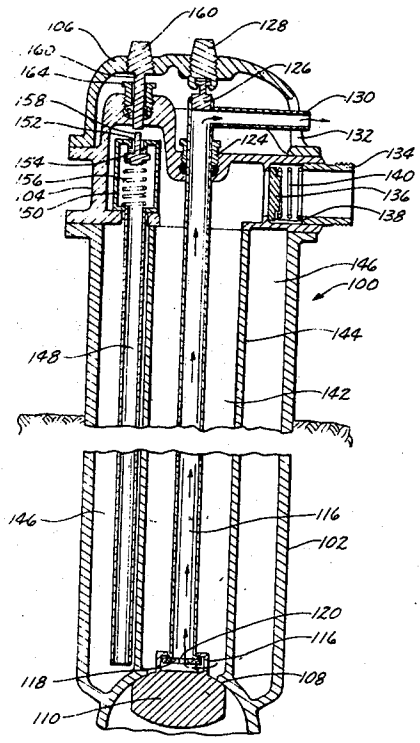
[52] U.S. Cl. 137/209, 137/301
[51] Int. Cl. E03b 9/14
[50] Field of Search 138/27, 32; 137/206, 207, 209, 272, 299, 308, 593, 240

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ABSTRACT: A hydrant having an inlet port and a discharge port with a fluid passageway therebetween, and an air compression chamber in communication with the fluid passageway wherein compressed air therein will purge the remaining fluid from the fluid passageway when the inlet port is closed.



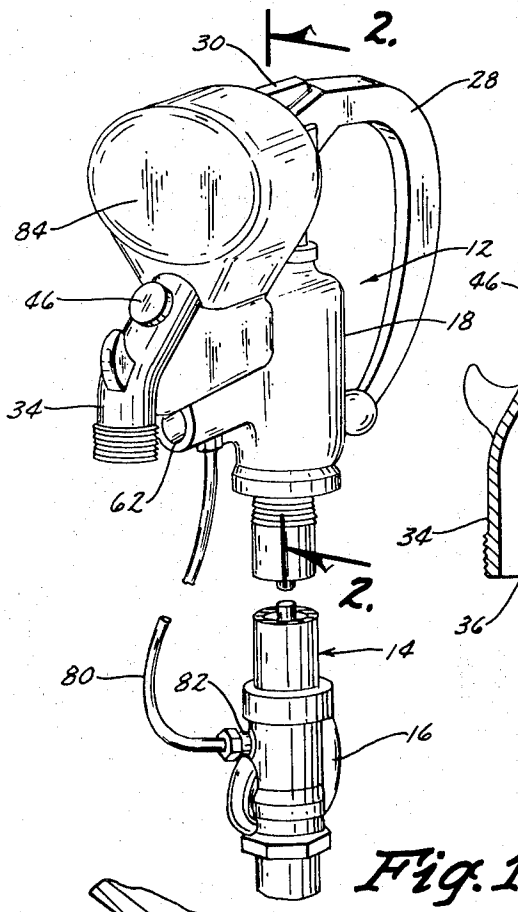


Fig. 1

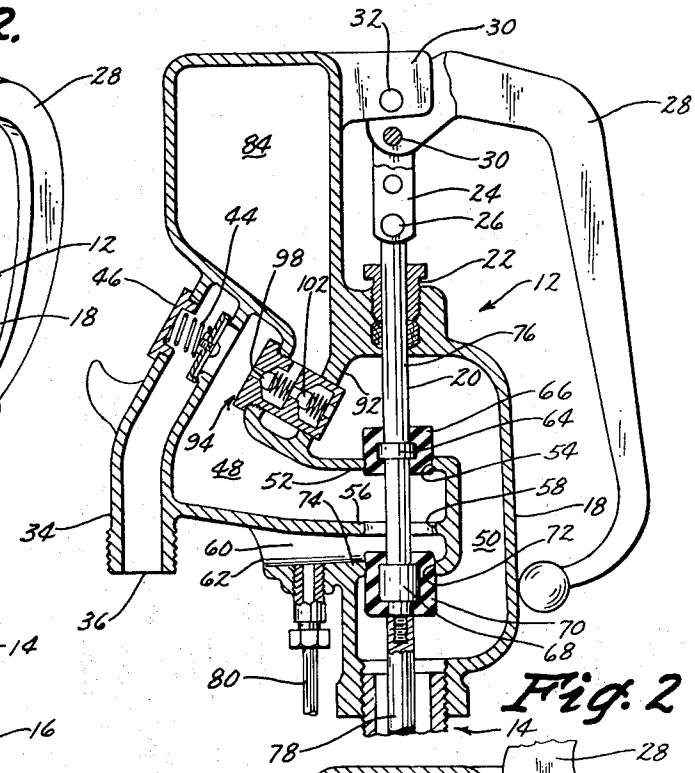


Fig. 2

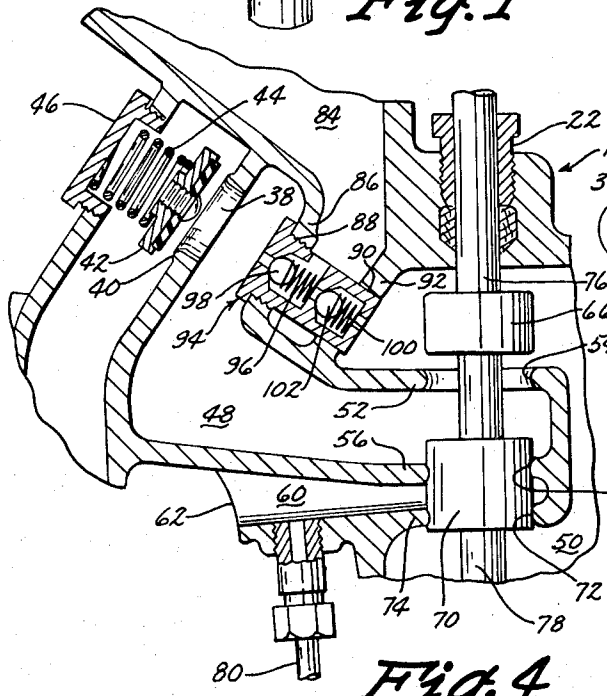


Fig. 4

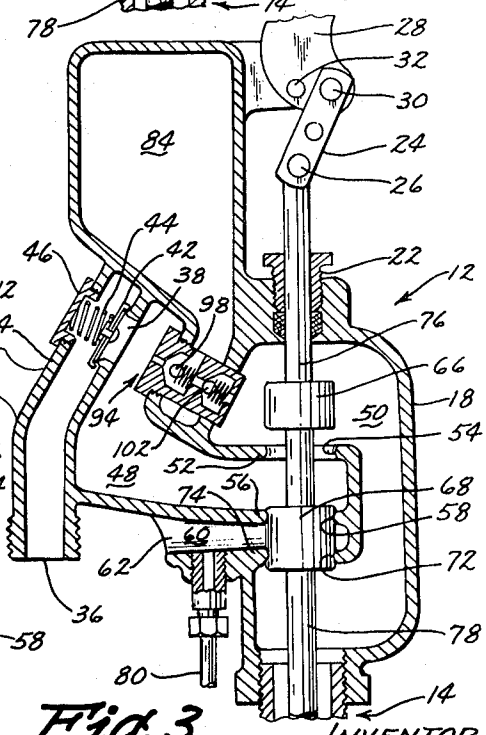
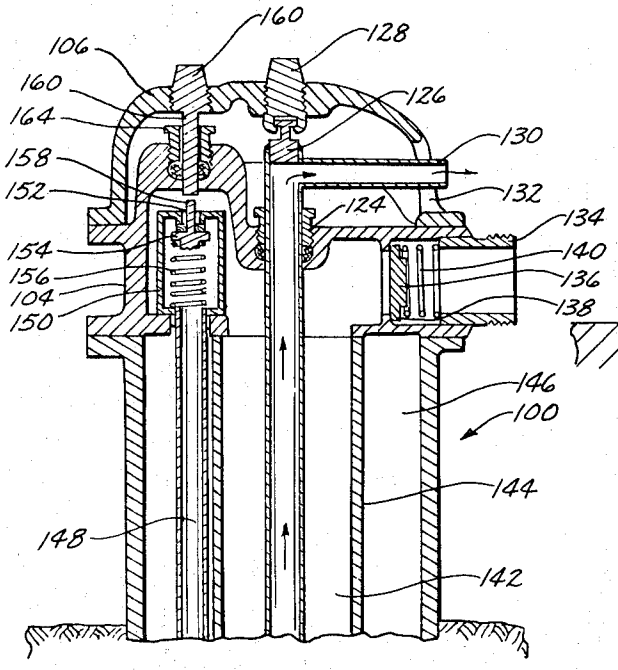


Fig. 3

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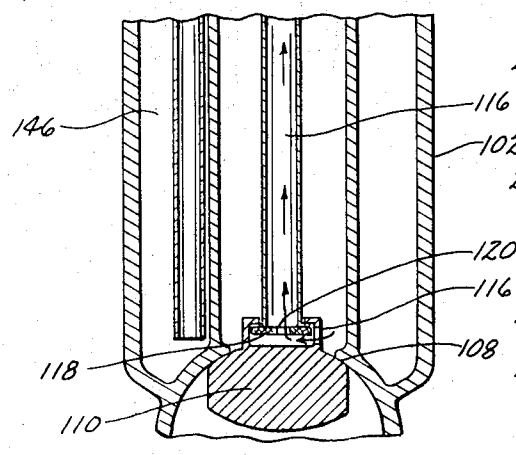


Fig. 5

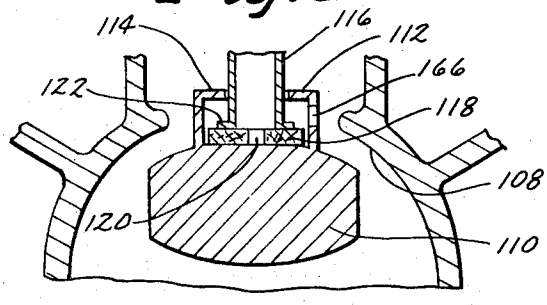


Fig. 8

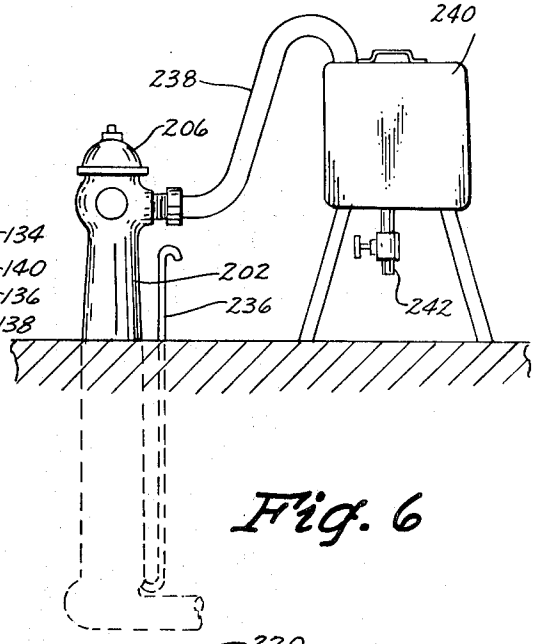


Fig. 6

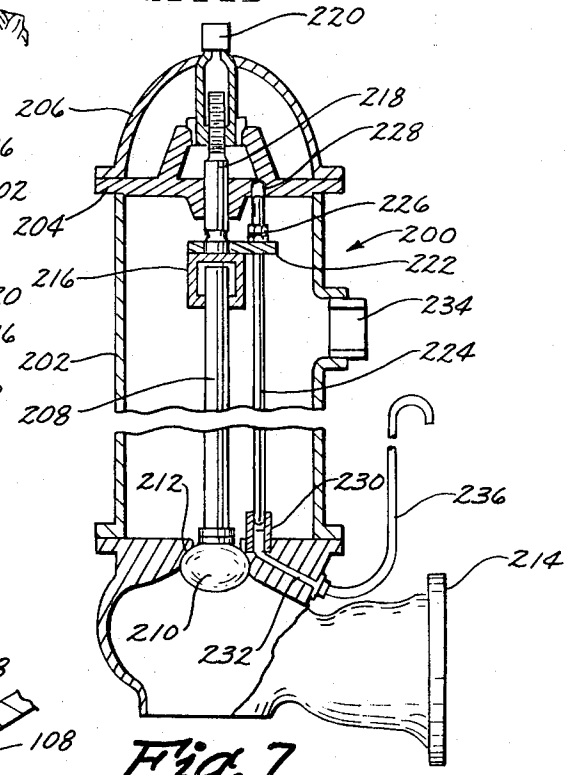


Fig. 7

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HYDRANT PURGING MEANS

This is a divisional application of copending application Ser. No. 640,676 filed May 23, 1967.

Ground hydrants are generally connected to an underground hydrant valve by a riser pipe and the hydrant valves are connected to a source of water under pressure. The water in the hydrant and riser pipe will freeze if permitted to remain therein during periods of freezing conditions. Obviously, a simple method of draining the water from the hydrant and riser pipe would be to drain the water from the bottom of the riser pipe to permit the water to be absorbed in the ground. However, most cities or the like have ordinances which prohibit such an underground drainage.

Fire hydrants must also be drained after use to permit the same from freezing during periods of freezing conditions. As with the ground hydrants, a simple method of draining the water from the hydrant would be to drain the water from the bottom of the hydrant to permit the water to be absorbed in the ground. However, as stated above, most cities have ordinances which prohibit such an underground drainage.

Therefore, it is a principal object of this invention to provide a hydrant of the nonfreezable type.

A further object of this invention is to provide a hydrant device which may be drained above the ground.

A further object of this invention is to provide a hydrant device having means therein for trapping air which may be used to purge the water from the hydrant and the riser pipe when the hydrant is turned off.

A further object of this invention is to provide a hydrant which may be operatively connected to a tank which will become filled with compressed air during the operation of the hydrant, the compressed air serving to purge the water from the hydrant after the hydrant is turned off.

A further object of this invention is to provide a hydrant device which is economical of manufacture, durable in use 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 perspective view of the hydrant device, riser pipe and hydrant valve;

FIG. 2 is an enlarged sectional view of the hydrant as seen along line 2–2 of FIG. 1 illustrating the hydrant in a closed position;

FIG. 3 is a sectional view similar to FIG. 2 except that the hydrant device is illustrated in an open position;

FIG. 4 is an enlarged sectional view similar to FIG. 3 illustrating the hydrant device in an open position wherein the check valve means has opened to permit fluid to pass from the discharge opening of the hydrant;

FIG. 5 is a fragmentary sectional view of the freezeless fire hydrant;

FIG. 6 is a side view illustrating a modified fire hydrant in communication with an air tank;

FIG. 7 is a fragmentary sectional view of the hydrant of FIG. 6; and

FIG. 8 is a fragmentary sectional view of the main valve of the hydrant of FIG. 5 and illustrating the main valve in an open position.

With respect to FIGS. 1—4, the number numeral 10 generally designates a yard hydrant comprised basically of an outlet head 12 having a riser pipe 14 threadably secured thereto and a hydrant valve 16 which is threadably secured to the lower end of riser pipe 14 and which is adapted to be in communication with a source of water under pressure.

The outlet head 12 includes a housing 18 which has a valve stem 20 vertically movably mounted therein which extends therethrough and downwardly through riser pipe 14 to hydrant valve 16. The lower end of valve stem 20 is connected to the internal components of valve 16 and is adapted to actuate and deactuate the valve 16 at times. A bushing 22 is threadably secured to housing 18 and embraces the upper end of valve stem 20 as seen in FIGS. 2 and 3. A link unit 24 is pivotally connected to the upper end of valve stem 20 by a pin 26 ad and is pivotally connected to one end of a handle member 28 by a pin 30. Handle member 28 is pivotally connected to a tongue portion 30 on housing 18 by a pin 32.

Outlet head 12 is also provided with a spout portion 34 having a discharge end 36 and an inlet opening 38. A valve seat 40 is provided around inlet port 38 and is adapted to receive a valve 42 thereon at times to seal the interior spout portion 36 from the interior of housing 18 at times. The numeral 44 designates a spring means which engages valve 42 at one end and engages a cap portion 46 at its other end which is threadably mounted in spout portion 34 as seen in FIGS. 2 and 3. Spring means 44 normally urges valve 42 into seating engagement with valve seat 40. Housing 18 is provided with a compartment 48 formed therein which communicates with inlet opening 38 at one end thereof. The numeral 50 designates a second compartment in housing 18, the lower end of which is in communication with the interior of riser pipe 14 as clearly illustrated in the drawings. A wall 52 defines a portion of chamber 48 and a valve seat 54 is provided therein. The lower end of compartment 48 is defined by a wall 56 having a valve seat 58 formed therein. A compartment 60 is provided in housing 18 below compartment 48 and has an auxiliary discharge opening 62 provided at one end thereof. The inner end of compartment 60 is in communication with the opening formed in wall 56 as defined by valve seat 58. Valve stem 20 is provided with a first enlarged diameter portion 64 having a valve means 66 mounted thereon and is also provided with a second enlarged diameter portion 68 having a valve means 70 provided thereon. As seen in FIGS. 2 and 3, valves 66 and 70 are adapted to seatingly engage valve seats 54 and 58 respectively at times. Valve means 70 also seatingly engages a valve seat 72 at all times regardless of whether the hydrant head is in an open or closed position. As seen in FIGS. 2 and 3, valve stem 20 includes an upper portion 76 and a lower portion 78 which are threadably secured together within housing 18.

A conduit 80 is connected to the drain fitting 82 of hydrant valve 16 and extends upwardly to wall 74 of housing 18 to which it is threadably secured to cause the compartment 60 and the drain fitting of hydrant valve 16 to be in communication with each other when the hydrant valve 16 is in a closed position. The numeral 84 designates a compartment formed in housing 18 as illustrated in FIGS. 2 and 3. A wall 86 is provided between the upper end of compartment 46 and a portion of the lower end of compartment 84 and is provided with an opening 88 formed therein. An opening 90 is provided in wall 92 which separates the lower end of compartment 84 from the upper end of compartment 50. A check valve means 94 is threadably mounted in wall 86 and extends through openings 88 and 90 as seen in FIGS. 2 and 3. Check valve means 94 includes a first passageway 96 which is yieldably sealed by a ball valve 98 and also includes a passageway 100 extending between passageway 96 and the upper end of compartment 50 which is yieldably sealed by a ball valve assembly 102.

The normal method of operation is as follows. When the hydrant head 12 is opened, (FIG. 3) the water will pass upwardly from hydrant valve 16 inasmuch as valve stem 20 is connected to the valve means within the hydrant valve 16. The water rising in riser pipe 14 will force the air out of the riser pipe 14 through compartment 50 and through the opening defined by valve seat 54, compartment 48 and check valve assembly 98 and into compartment 84. The strength of the spring means 44 is greater than the spring means associated with check valve assembly 98 which therefore causes the check valve assembly 98 to be opened by the forced air while the valve 42 will initially remain closed. When sufficient pres-

sure has accumulated in compartment 84, the spring loaded valve 42 will then be forced open a inasmuch as the force required to open valve 42 will then be less than the force required to further compress the air within compartment 84. The opening of valve 42 permits the fluid to flow out of the nozzle 34 and the air in compartment 84 will remain trapped therein during the time that the water is flowing from the nozzle 34.

When the hydrant is closed or moved to the position of FIG. 2, the valve 66 will seat upon its valve seat 54 while valve 70 will be unseated from its valve seat 58. The accumulated air pressure in compartment 84 passes through check valve assembly 102, compartment 50 and the interior or riser pipe 14 thereby forcing the water out of the compartment 50 and riser pipe 54 outwardly through the drain fitting 82, upwardly through conduit 80 and outwardly through opening 62. Any water remaining in compartment 48 will pass through the opening defined by valve seat 58 and into compartment 60 and outwardly through discharge opening 62. Thus it can be seen that the closing of the hydrant effectively purges the water from the hydrant head, riser pipe and hydrant valve. The water is discharged from the hydrant head 12 at a point above the ground thereby complying with various city ordinances. The hydrant head and the riser pipe will not freeze during times of freezing conditions inasmuch as the water has been purged therefrom through the closing of the hydrant.

It should be noted that compartment 84 could be located practically anywhere as long as there was a conduit connecting the interior of the hydrant head with the same. The size of compartments 48 and 84 will vary depending upon the amount of water that must be purged from the system. It should also be noted that the hydrant will function without check valve means 94 although somewhat less efficiently than when they are included. It is also obvious that the hydrant head design may be varied slightly so that the opening 62 and opening 36 are combined or are in communication with each other.

The outlet head 18 may be fabricated from cast iron while the handle portion 28 may be fabricated from a malleable iron material if desired. The valve 66 and valve 70 are of a resilient material such as neoprene or the like. Thus it can be seen that the hydrant of FIGS. 1—8 accomplishes at least all of its stated objectives.

FIGS. 5 and 8 illustrate another self-draining, freezeless hydrant which is specifically designed to be used as a fire hydrant. In FIG. 5, the fire hydrant is generally designated by the reference numeral 100 and is seen to include a stand pipe portion 102 having a top plate portion 104 secured to the upper end thereof by bolts or the like which are not shown. A bonnet 106 is secured to the upper end of top plate 104 by bolts or the like which are not shown. The lower end of hydrant 100 is provided with a valve seat 108 which is adapted to seatingly receive valve 110. Valve 110 includes a hollow sleeve 112 which extends upwardly from the upper end thereof and which has a flange portion 114 extending horizontally inwardly from the upper end thereof. As seen in FIGS. 5 and 8, a hollow valve stem 116 is slidably received at its lower end by sleeve 112 and has a seal means 118 secured to the lower end thereof. Seal means 118 is provided with a central opening 120 formed therein which permits communication between the interior of valve stem 116 and the interior of sleeve 112 when the valve stem 116 is raised to the position seen in FIG. 5. As seen in FIG. 8, the lower end of valve stem 116 is provided with an outwardly extending flange portion 122 which is adapted to engage the under side of flange 114 to limit the upward movement of valve stem 116 with respect to valve 110.

Valve stem 116 slidably extends through a seal means 124 which is mounted in top plate 104 and has a swivel means 126 mounted in the upper end thereof which seals the upper end of valve 116 and which is rotatably received by a wrench nut 128 which is threadably mounted in bonnet 106. Valve stem 116 is provided with a horizontally extending drain pipe 130 which extends outwardly through opening 132 in bonnet 106. Hydrant 100 is provided with a conventional discharge outlet 134 and may be provided with an optional check valve means 136 which is mounted inwardly of discharge outlet 134 to yieldably resist the flow of water outwardly through outlet 134. As seen in FIG. 5, check valve means 136 is comprised of a valve member 138 and a spring means 140. The interior of hydrant 100 is provided with a chamber portion 142 through which valve stem 116 extends and which is defined by a wall member 144 extending therearound. Thus, the rotation of wrench nut 128 will cause valve stem 116 to be vertically moved and the engagement of seal 118 with the valve 110 will cause valve 110 to be moved downwardly out of seating engagement with valve seat 108 and a engagement of flange 122 with flange 114 will cause valve 110 to be moved upwardly into seating engagement with valve seat 108 (FIG. 5).

Wall 144 separates chamber portion 142 from chamber portion 146 and a hollow tube 148 is positioned within chamber portion 146 so that its lower end terminates at a point above the lower end of chamber portion 146 and so that its upper end extends through top plate 104 as best seen in FIG. 5. The upper end of tube 148 is provided with an enlarged diameter portion 150 having an opening 152 formed in the upper end thereof which is normally closed by a check valve means 154 including a spring means 156. As seen in FIG. 5, check valve means 154 includes a plunger portion 158 which extends upwardly through opening 152. A wrench nut 160 is threadably mounted in bonnet 106 and has a stem portion 162 extending downwardly therefrom through gland 164 in plate 104 which is adapted to engage the upper end of plunger 158 at times to move check valve means 154 out of its seating engagement to permit fluid to flow through opening 152. As seen in FIG. 5, chamber portion 146 is sealed from chamber portion 142 with the only possible means of communication therebetween being through the opening 152 which is normally closed by the check valve means 154. When optional check valve means 136 is utilized, spring 156 should be weaker than spring 140 for a purpose to be described later.

With respect to hydrant 100 seen in FIGS. 5 and 8, the normal method of operation is as follows. Hydrant 10 is opened by simply rotating wrench nut 128 in a manner to cause valve stem 116 to be moved downwardly from the position of FIG. 5. Valve stem 116 will be moved downwardly a short distance before valve 110 will be unseated inasmuch as valve stem 116 is slidably mounted within sleeve 112. As soon as seal 118 has been moved downwardly a sufficient distance to engage the upper end of valve 110, valve 110 will be moved downwardly from its seating engagement with valve seat 108. The water will then flow upwardly through the opening defined by valve seat 108 into chamber portion 142. Seal 118 is in engagement with the upper end of valve 110 at this time which prevents water from entering the interior of valve stem 116 since seal 118 extends around opening 120 thereby preventing fluid from passing upwardly through valve stem 116. Sleeve 112 is provided with an opening 166 through which fluid can pass into the interior of sleeve 112. Prior to valve 110 being opened, chamber portion 142 will not contain any liquid but will be filled with air. When valve 110 is open, the rising water will force the air thereabove upwardly in chamber portion 142 and the air pressure will cause check valve means 152 to unseat thereby causing the air in chamber 142 to pass downwardly through opening 152, the interior of tube 148 and into chamber portion 146. The air will be forced into the interior of tube 148 rather than out discharge outlet 134 inasmuch as a substantial length of hose will normally be secured thereto which will offer a sufficient resistance to the air so that the check valve means 154 will be opened prior to the air passing out discharge outlet 134. If a sufficient amount of hose is not being utilized on the discharge outlet, the device should be provided with optional check valve means 136 which will not open until the air is compressed within chamber portion 146 to such a degree that the pressure necessary to overcome spring 140 will be less than the pressure required to

further compress the air within chamber portion 146. Thus, the air within chamber portion 142 will be forced into chamber portion 146 and compressed therein until such time as the air is compressed to a degree which will cause the air to pass outwardly through discharge outlet 134 at which time check valve means 154 will close. The water will be discharged from discharge outlet 134 during the time the hydrant is being used.

The hydrant is shut off by simply turning wrench nut 128 in such a manner so that valve stem 116 will be moved vertically within chamber portion 142 which will cause valve 110 to be raised upwardly into seating engagement with valve seat 108 as viewed in FIG. 5. It can be seen in FIG. 5 that the vertical movement of valve stem 116 will cause seal 118 to move out of engagement with the upper end of valve 110 until flange 122 engages the underside of flange 114 thereby causing the interior of valve stem 116 to be in communication with the interior of chamber portion 142. As soon as valve 110 is closed, wrench nut 160 is threadably rotated so that its stem 162 is moved downwardly through gland 164 to engage the upper end of plunger 158 of check valve means 154 to cause the check valve means to move out of seating engagement so that opening 152 will be open. As soon as check valve means 154 is opened, the compressed air within chamber portion 146 will move upwardly through tube 148 and through opening 152 into the upper end of chamber portion 142. The compressed air forces the water from chamber portion 142 through opening 166 in sleeve 112 and upwardly through valve stem 116 and outwardly through drain pipe 130. It has been found that for the best draining results, chamber portion 146 should have a volume which is three times greater than the volume of chamber portion 142. As soon as the water has been purged from chamber portion 142, wrench nut 160 will then be rotated so that check valve means 154 can again close opening 152. Thus it can be seen that the hydrant initially compresses air within chamber portion 146 upon the opening of the valve 110 and this compressed air later serves to purge the water from chamber portion 142 upon the valve 110 being closed. The hydrant is effectively drained of its water at a point above the ground which will not only prevent the hydrant from freezing but which complies with the various city ordinances which requires that any drainage be discharged above the ground. Thus it can be seen that the hydrant of FIGS. 5 and 8 accomplishes at least all of its stated objectives.

A third hydrant device is illustrated in FIGS. 6 and 7 and is also designed to purge water from the interior of a hydrant 200 through the use of compressed air. The hydrant 200 includes a stand pipe portion 202 having a top plate 204 and a bonnet 206 mounted thereon in conventional fashion. A valve stem 208 is mounted in the interior of hydrant 200 and has a valve 210 at the lower end thereof which is adapted to seat upon valve seat 212 to prevent the flow of fluid from elbow 214 to the interior of hydrant 200. The upper end of valve stem 208 is operatively connected to a stem extension 216 which in turn is operatively connected to a gland bolt 218 which is threadably secured to a wrench nut 220. The rotation of wrench nut 220 will cause valve stem 208 to be vertically moved within hydrant 200 in conventional fashion.

A cross arm 222 is secured to gland bolt 218 and extends horizontally outwardly therefrom as seen in FIG. 5. A drip rod 224 is secured to the outer end of cross arm 222 by means of nuts 226. The upper end of drip rod 224 is adapted to be received by a guide cup 228 while the lower end thereof is adapted to be received in a drip cup 230. The interior of drip cup 230 is in communication with the interior of a drip hole which extends outwardly through elbow 214 as seen in FIG. 7. Thus, when drip rod 224 is in its lowermost position, and when valve 210 will be opened, the interior of hydrant 200 is sealed from the atmosphere except through discharge outlet 234. When drip rod 224 is in its uppermost position, and when valve 210 is closed, the interior of hydrant 200 will be in communication with the interior of drip hole 232. A drain pipe 236 is secured to elbow 214 so that the interior thereof is in communication with drip hole 232. As seen in FIG. 6, drain 236 extends upwardly from drain hole 232 to a point above the ground so that any water discharged therefrom will be discharged above the ground. The numeral 238 designates a hose which is operatively secured to discharge outlet 234 and the numeral 240 designates a tank having a drain valve 242 provided at the lower end thereof. Drain valve 242 may include a pressure relief valve if desired which which would open at a predetermined pressure if so utilized.

The hydrant is purged of any water contained therein by simply connecting hose 238 to the discharge outlet 234 and opening the valve 210 by means of wrench nut 220. Water will be forced into the interior of tank 240 which will cause the air therein to be compressed. When the air has been compressed sufficiently in tank 240, the hydrant will be closed and the compressed air in tank 240 (which will be above the water level in the tank) will pass therefrom into hose 238 an and into the interior of hydrant 220 and will force the water therefrom outwardly through drain hole 233 an upwardly through drain 236 where it will be deposited on the ground. The compressed air effectively purges all of the water from the interior of the hydrant and the hydrant will not become frozen during periods of freezing conditions. The remaining water in the tank 240 can then be drained therefrom by means of drain valve 242. The hose 238 can then be disconnected from discharge outlet 234 and the tank can be moved to the next hydrant to be drained. As previously stated, drain valve 242 could be a pressure relief which would pass water therethrough after a certain pressure had been reached within the tank 240. Obviously, the pressure relief valve would be set at the pressure needed to effectively purge the water from the hydrant. Thus it can be seen that the device accomplishes at least all of its stated objectives.

I claim:

1. In a hydrant:

said hydrant having an inlet port and a discharge port with a fluid passageway therebetween;

an air compression chamber in said hydrant adapted to be placed in communication with said fluid passageway;

a first valve means in said inlet port controlling fluid communication between said fluid passageway and a source of water under pressure;

a second valve means controlling fluid communication between said fluid passageway and said air compression chamber;

a valve element on said first valve means controlling communication between the passageway and the outside of said hydrant, said valve element being normally open when said first valve means closes said inlet port; and

said second valve means comprising a check valve element to permit the flow of air from said fluid passageway to said air compression chamber under the compressive action of the water flowing flowing through the inlet port, and a manual valve release element to overcome said check valve element to permit the release of air from said air compression chamber into said fluid passageway.

2. In a hydrant:

said hydrant having an inlet port and a discharge port with a fluid passageway therebetween;

an air compression chamber in said hydrant adapted to be placed in communication with said fluid passageway;

a first valve means in said inlet port controlling fluid communication between said fluid passageway and a source of water under pressure;

a second valve means controlling fluid communication between said fluid passageway and said air compression chamber;

and a valve element on said first valve means controlling communication between the passageway and the outside of said hydrant, said valve element being normally open when said first valve means closes said inlet port;

said second valve means comprising a check valve element to permit the flow of air from said fluid passageway to said air compression chamber under the compressive action of the water flowing through the inlet port; and

means connected to said check valve element to permit the release of air from said air compression chamber into said fluid passageway to purge the fluid therefrom to the outside of said hydrant.

3. In a hydrant:

said hydrant having an inlet port and a discharge port with a fluid passageway therebetween;

an air compression chamber in said hydrant adapted to be placed in communication with said fluid passageway;

a first valve means in said inlet port controlling fluid communication between said fluid passageway and a source of water under pressure;

a second valve means controlling fluid communication between said fluid passageway and said air compression chamber;

a valve element on said first valve means controlling communication between the passageway and the outside of said hydrant, said valve element being normally open when said first valve means closes said inlet port; and

a hollow valve stem operatively connected to said first valve means and the valve element in said first valve means, said valve stem serving as a fluid passageway from said valve element to the outside of said hydrant at a point above ground level when said valve element is opened.

4. The hydrant of claim 3 wherein said hydrant includes means for moving said valve stem longitudinally to actuate said first valve means and said valve element.

5. The hydrant of claim 3 wherein said first valve means includes a closure element adapted to seat on said inlet port, and said valve element includes a closure means adapted to seal on the closure means of said first valve means and means on said hydrant for moving said valve stem longitudinally whereby movement in one direction will close said first valve means on said inlet port and will open said valve element, and movement in the opposite direction will close said valve element and will open said first valve means from said inlet port.