P. HAAS.

FROST PROOF VALVE MECHANISM.

APPLICATION FILED DEC. 2, 1918.

1,303,472.

Patented May 13, 1919.

Fig:1.

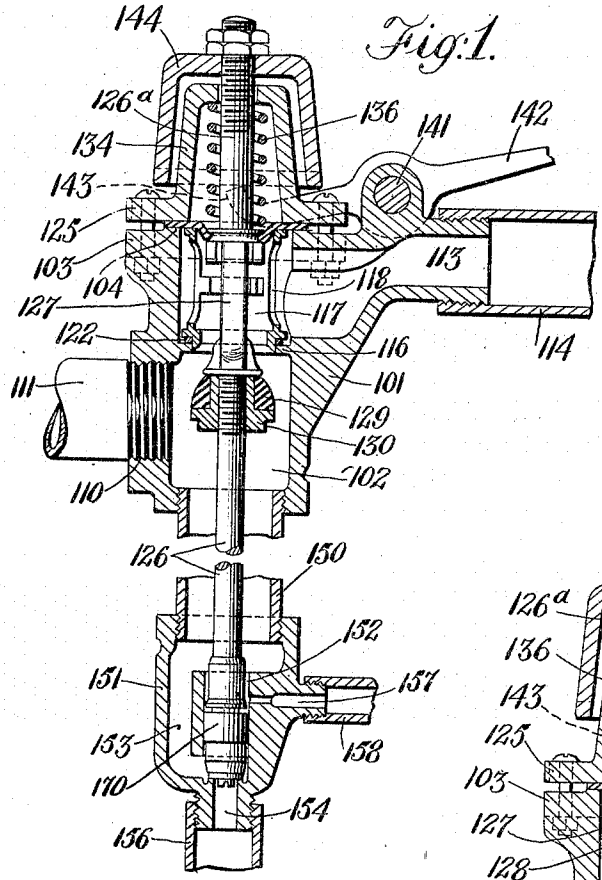


Fig:3.

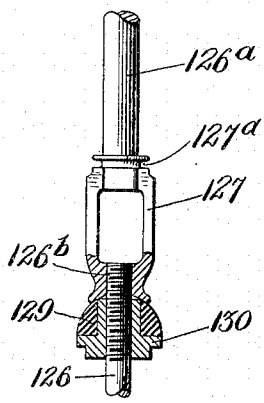


Fig:2.

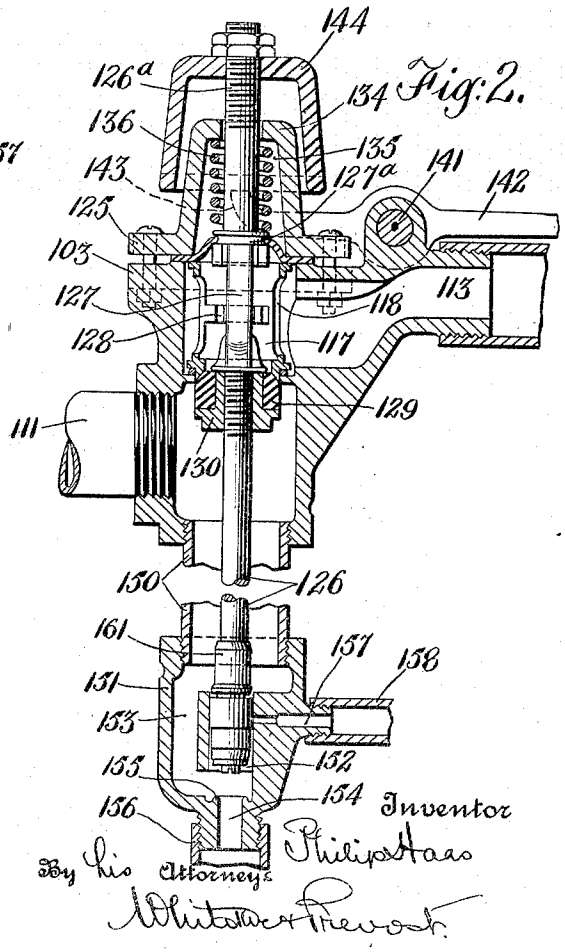
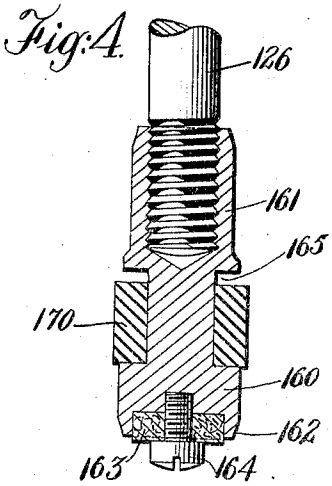


Fig:4.



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UNITED STATES PATENT OFFICE.

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FROST-PROOF VALVE MECHANISM.

1,303,472. Specification of Letters Patent. Patented May 13, 1919.

Application filed December 2, 1918. Serial No. 264,907.

To all whom it may concern:

Be it known that I, PHILIP HAAS, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Frost-Proof Valve Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawing, which illustrates an embodiment of my invention selected by me for the purpose of illustration, and said invention is fully disclosed in the following description and claims.

My invention relates to what is termed an anti-freezing or "frost-proof" valve, especially adapted for flushing purposes, or for use as a hydrant, of the general type illustrated in my former U. S. Letters Patent, No. 1,034,789, granted August 6, 1912, and No. 1,111,744, granted September 29, 1914.

One of the objects of this type of valve mechanism is the location of the primary, or water inlet valve, at a point considerably below the surface of the ground and below the frost line and the provision of means whereby any water standing in the pipe leading from the water inlet valve to the outlet of the apparatus, and which is not discharged in the normal use of the apparatus, may be drained therefrom into the sewer, so that such pipe and mechanism within the influence of frost shall remain normally empty, thus preventing freezing of the apparatus which would otherwise prevent its use during periods of extreme low temperature. These devices, whether used as flushing devices or hydrants, are ordinarily located in exposed places, either out of doors, or in structures not provided with artificial heat, and are thus subject at all times to ordinary atmospheric temperatures.

In the construction of these frost-proof valve mechanisms it is customary to employ, adjacent to the water inlet valve, a plunger operating to close the waste opening, or drain opening, when the main water inlet valve is open, and as this plunger is located at a considerable distance below the ground, and a greater distance below the water outlet, there is always danger of the plunger sticking fast on account of the accumulation around it of lime or other mineral or solid mater in the water. One of the objects of my present invention is to overcome this difficulty, to which end the plunger is made to fit loosely or with ease in a cylindrical seat or passage, provided for it in the inlet valve casing, and to provide it with a loose expanding rubber ring, which is moved into position to close the waste drain opening when the inlet valve is opened, and which, for all practical purposes, constitutes a side closing valve, while the freedom of movement of the metallic plunger is such as to prevent its sticking or becoming fast in its metallic seat or passage, no matter how long the intervals during which the valve mechanism is used.

I also prefer to provide in connection with this frost-proof valve mechanism a rotatably adjustable throttling sleeve for the purpose of preventing a too rapid discharge of water through the outlet passage of the valve mechanism, and also to locate an actuating spring, which holds the water inlet valve closed, in an exterior recess, separated from the water passages by an elastic diaphragm, so that I may dispense with the usual stuffing box and employ, where desired, an ordinary steel spring, instead of a spring of non-rusting and non-corroding metal to cheapen the structure, thus simplifying and cheapening the cost of the apparatus.

I also prefer to construct the main valve case or body of cast iron and to provide a closure therefor, comprising a clamping member secured to the valve casing by bolts and nuts, or screws, and clamping the diaphragm, as well as the adjustable sleeve in position, thus simplifying the structure and reducing the amount of machine work required, and where the apparatus is used for flushing purposes, a secondary valve is employed on the common valve stem in conjunction with a seat at the inner end of the said adjustable sleeve. These features are broadly claimed in a separate application for U. S. Letters Patent, filed by me on or about December 2nd, 1918, Serial No. 261,906.

The apparatus is also constructed so that by the removing of the closure cap the valve stem, together with all valves, can be re-

moved from the apparatus for adjustment or repair without disturbing otherwise the valve casing, or digging up the portion of the apparatus embedded in the ground.

In the accompanying drawing which illustrates an embodiment of my invention, selected by me for purposes of illustration,—

Figure 1 represents a sectional view of a frost-proof valve mechanism for flushing purposes, a portion of the connecting pipe and valve stem between the upper and lower valve casing being broken away, the inlet valve being shown in closed position and the flushing valve being shown in open position, the waste passage being also shown open for draining the portion of the mechanism above the same.

Fig. 2 is a similar view showing the valve stem raised, the inlet valve open, the waste opening closed, and the secondary or flushing valve closed, in which position, as shown, the inlet water would pass to the usual flushing tank, (not shown).

Fig. 3 is a detail of a portion of the valve stem, and the secondary or flushing valve, carried thereby.

Fig. 4 is a detailed sectional view of the plunger at the lower end of the valve stem and water inlet valve, and waste valve carried thereby.

In the drawing 101 represents the upper valve body or casing, which is provided with a longitudinal vertical passage 102. The said body having at its upper end a clamping member 103, on the outer face of which is provided an annular seat, 104, to receive a packing member hereinafter described. At its opposite end, the valve body, 101, is provided with a threaded aperture to receive a connecting pipe, 150, at the lower end of which is the lower valve casing, 151, or inlet valve casing. This inlet valve casing, or body, consists of a cast metal body, provided with a centrally located tubular passage, 152, and a lateral by-pass, 153, which connects the spaces above and below the passage 152, and the valve body is provided below and in line with the centrally located passage, 152, with an inlet aperture, 154, at the upper end of which is located the inlet valve seat 155. The lower end of the valve casing, 151, is also provided with a threaded portion which is connected to the water main by pipe indicated at 156. This valve casing is also provided with a lateral discharge, 157, or waste opening, connected at its inner end with the centrally located passage 152, and having at its outer end a threaded portion, provided on the valve body, for connecting this passage 157, with the sewer by means of a pipe 158.

Within the centrally located passage, 152, is a plunger 160, which fits loosely in said passage and preferably is reduced in diameter at its upper portion, as indicated at 161, and its extreme lower portion, as indicated at 162. The lower face of this plunger is provided with a recess in which is located a packing washer, or valve 163, which constitutes the inlet valve and is held in place by the usual screw, 164. The plunger is also provided with a centrally located solid portion of reduced diameter, forming an annular recess above the inlet valve, indicated at 165, in which is located an elastic expansion ring, 170, preferably of rubber, which normally lies below the waste opening, 157, when the inlet valve is closed, but which is raised to a position to close the waste opening, 157, when the inlet valve is opened, as shown in Fig. 2, and acts as a side-closing valve.

The expansion ring is loosely fitted on the reduced portion of the plunger in the recess, 165, when the parts are assembled as the action of water in time tends to cause this ring to swell, and it at all times acts similarly to an expanding piston ring with sufficient accuracy to close the waste outlet, while the loosely fitting plunger prevents it from sticking in the passage 152. The upper end of the plunger is connected to the valve stem, 126, in any desired way. In this instance, it is provided with threaded recesses, into which the lower threaded end of the valve stem is screwed.

The upper valve body, 101, where the device is intended to be used as a flushing valve, is provided internally with an annular flange, 116. Above the flange, 116, the valve body is provided with lateral outlet passage 113, which in the case of a flushing apparatus, is connected by a pipe, 114, with the bowl. The valve body is provided below the flange 116, with a lateral aperture, 110, connected by means of a pipe, 111, with the usual closed flushing tank.

The flange, 116, supports a removable and rotatably adjustable sleeve, 117, preferably of brass, and provided with one or more lateral water discharge apertures, 118. This sleeve is provided adjacent to each end, with a flange (119 and 120) and at the lower end the sleeve is provided with a valve seat, 121, and an annular recess, in which is located a gasket, 122, which engages the annular flange, 116, for the purpose of forming a tight joint. The outer, or upper, end of the sleeve is substantially flush with the annular seat, 104, of the valve body 101, and the rubber diaphragm, 123, having a central aperture for the passage of the valve stem, is placed in engagement with the end of the sleeve, and said annular seat, 104. This diaphragm is held in position by a clamping member, 125, provided with bolt holes, corresponding with bolt receiving recesses in the clamping member 103, of the valve body, and is connected to the valve body by means of bolts and nuts, or screws, thereby forcing

it against the diaphragm and against the end of the sleeve, 117, and firmly clamping both diaphragm and sleeve in position and holding the sleeve against rotation.

As will be readily understood, the sleeve, 117, can be turned and adjusted before the clamping bolts are tightened so as to bring one of the lateral water apertures more or less into registration with the discharge passage, 113, of the upper valve casing so that the water passing through said casing and sleeve will be more or less throttled according to the position in which the sleeve is placed.

126 and 126[a] represent the valve stem which extends longitudinally through the upper valve body, the sleeve, 117 the connecting pipe 150, and the lower valve casing 151. For convenience in assembling these parts, this valve stem is made in two sections, the lower section, 126, being secured, as hereinbefore stated, to the plunger 160, for operating the water inlet valve and waste valve and being connected to the upper section 126[a] by the threaded portion 126[b], as indicated in Fig. 3. The upper section, 126[a], of the valve stem, is provided with a yoke portion, 127, which has a guiding engagement with the guiding projections, 128, on the interior of the sleeve, 117. Above the yoke the valve stem is provided with an annular groove, or recess, 127[a], in which the inner edge of the diaphragm is retained. Above this grooved portion, the stem extends through a conical extension, 134, on the clamping member, 125, within which conical extension a recess, 135, is formed to receive a spring, 136, which bears upon a shouldered portion of the stem, thereby depressing the stem and holding it in its lowermost position, and maintaining the inlet valve, 103, in closed position and the waste valve in open position.

Where the apparatus is used as a flushing device, the valve stem is provided with an auxiliary valve, or flushing valve, which operates in conjunction with the valve seat, 116, at the lower end of the sleeve, 117, to close the communication between the tank and the outlet passage 113. For convenience in attaching this valve to the valve stem, I prefer to employ an internally threaded sleeve, 130, provided with a flange at its lower end, upon which is placed a hemispherical valve, 129, of rubber or other suitable material, the valve supporting sleeve being threaded upon the upper end of the lower section 126, of the valve stem below the yoke portion, 127, of the upper section, as clearly shown in the drawing.

This auxiliary valve, 130, is also held normally in open position by the spring, 136. The valve stem can be raised against the pressure of the spring in any desired way. In the present instance, I have shown a cap, 144, secured at the upper end to the valve stem by suitable nuts, on a threaded portion of the stem, the said cap, 144, being provided with flange portions (indicated in dotted lines) which are engaged by the forked end of a lever, 142. In the case of a hydrant, this lever can be operated by hand and it can also be operated in the same manner when the device is used as a flushing apparatus, but I prefer to connect the operating portion of the lever, 142, to the seat, in a well known way, the pivot of the lever becoming the pivot of the seat, so that when the seat is depressed, the forked portion of the lever acts upon the cap 144 and raises the stem. The normal positions of the parts is illustrated in Fig. 1, in which the inlet valve 163 is closed and the auxiliary valve 129 is open, the valve stem being in its lowest position. When the seat is depressed or the lever 142 is otherwise operated, to raise the valve stem, the inlet valve will be opened, the auxiliary valve closed and the expansion ring, or waste valve will be made to close the waste outlet, 157, as clearly shown in Fig. 2. The water now enters from pipe 156 and passes through the by-pass 153 and the connecting pipe 150 around and out of contact with the portion of the plunger and the expansion ring valve 170 thereon lying within the passage 152 to the upper valve casing, passing thence through pipe 111 to the closed flushing tank and compressing the air therein until the air pressure balances the initial pressure of the water in the supply pipe 156. It will be noted that the expansion ring valve 170 lies within the tubular passage 152 and between the inner face thereof and the solid central portion of the piston or plunger, and is very little exposed to the water passing through the valve. It will therefore remain in perfect operative condition much longer than it would were it continually exposed to large volumes of water. When the seat is released or the lever 142 is otherwise released, the spring 136 depresses the valve stem thereby seating the inlet valve 163 and shutting off communication with the water main while the auxiliary valve 129 is opened. The pressure of the compressed air on the water in the tank in a well known way forces the water from the tank into the upper valve casing and out through the discharge passage 113 (see Fig. 1,) to the bowl, if the device is used as a flushing apparatus.

As soon as the air pressure in the tank has expelled the water therefrom, during which period a slight amount of water will be discharged through the waste opening, without, however, affecting materially the discharge through the passage 113, which is of much greater diameter, the water remaining in the upper valve casing and in the connecting pipe 150, will be drained through the waste passage 137, now uncovered by the descent of the plunger 160, thus freeing the exposed

portions of the apparatus from contained water and precluding the possibility of the apparatus being put out of operation by freezing.

When the device is intended for use as a hydrant, the pipe 111 will naturally be omitted, as well as the auxiliary valve 129 and the aperture for the pipe 111 can be closed by a plug, or the valve casing, which is of cast metal, can be made without such opening. It will be noted that in this apparatus only a few parts of the device need be made of brass or other non-rusting metal. For example, such parts as the lower valve casing, the plunger, the supporting sleeve for the auxiliary valve, the adjustable sleeve 117, and the upper section of the valve stem will ordinarily be made of brass, while the rest of the apparatus may be made of cast iron, or other cheaper metal, together with the spring 136, which, by reason of its location, exterior to the diaphragm, is prevented from rusting.

What I claim and desire to secure by Letters Patent is:—

1. In a frost proof valve mechanism, the combination with a valve casing, provided with a water inlet, a tubular passage above the water inlet, a lateral waste passage communicating therewith, and a by pass extending from the water inlet laterally of and around the tubular passage, to a point above said passage, of a reciprocating plunger in said passage provided at its lower end with a valve for closing the water inlet, said plunger loosely fitting said tubular passage and having a solid portion of reduced diameter within said passage, and an expansion ring of elastic material surrounding said solid reduced portion of the plunger and acting as a piston ring, said expansion ring being normally out of registration with the lateral waste passage, but located in position to close said passage when the inlet valve is in open position, whereby said expansion ring is protected from the water passing through the valve by its location within said tubular passage and between the walls of said passage and the solid reduced portion of the plunger.

2. In a frost-proof valve mechanism the combination with a lower valve casing, adapted to be located below the frost line and provided with a water inlet, a guiding passage above the same, a waste passage connected therewith, and a by-pass extending around said passage, a plunger in said guiding passage provided with an inlet valve, and an annular expansion ring for closing said waste passage when the inlet valve is in open position, of an upper casing, provided with a vertical passage and a water outlet connected therewith, a rotatably adjustable sleeve in said upper casing provided with a lateral water opening for throttling the water outlet, a pipe connecting said casings, a valve stem extending through said casing and connecting pipe, and operatively connected with said plunger, interengaging parts on said valve stem and sleeve connecting them for joint rotation without interfering with the longitudinal movement of the valve stem through said sleeve, a spring operatively connected with said valve stem for holding the inlet valve normally closed and means for moving said valve stem against said spring.

3. In a frost-proof valve mechanism the combination with a lower valve casing, located below the frost line and provided with a water inlet, a guiding passage above the same, a waste passage connected therewith, and a by-pass extending around said passage, a plunger in said guiding passage provided with an inlet valve, and an annular expansion ring for closing the said waste passage, when the inlet valve is in open position, of an upper casing provided with a vertical passage, and a water outlet connected therewith, a rotatably adjustable sleeve in said upper casing provided with a lateral opening for throttling the water outlet and having a valve seat at its lower end, a connecting pipe connecting said upper and lower casings, a valve stem extending through said casings and connecting pipe, and connected at its lower end to said plunger, interengaging parts on said valve stem and sleeve connecting them for joint rotation, without interfering with the longitudinal movement of the valve stem through said sleeve, an auxiliary valve carried by said stem within said upper casing, in position to engage the seat on said sleeve when the plunger is raised, said upper casing being provided with a tank outlet on the opposite side of said valve seat from the water outlet, a spring engaging said stem and normally holding the inlet valve closed and an auxiliary valve open and means for moving the valve stem against the pressure of said spring to close the auxiliary valve and open the inlet valve.

4. In a valve mechanism, the combination with a valve body having an opening at one end provided with inlet and outlet apertures, an inlet valve controlling the inlet opening, a valve stem connected with said inlet valve and extending through the end opening of the body, a rotatably adjustable sleeve mounted in said valve body, surrounding the valve stem and provided with a lateral discharge aperture adjacent to the outlet aperture of the body, said sleeve having its outer end substantially flush with the end opening of the valve body, a diaphragm closing the end opening of the valve body, engaging the end of said sleeve, and having a central aperture for the passage of said

valve stem, said stem having a shoulder to engage said diaphragm, a clamping member for clamping the marginal portions of the diaphragm to the valve body and the end of said sleeve, and holding said sleeve in adjusted position, means for securing the clamping member to said main body, said clamping member having a spring containing recess exterior to said diaphragm, a spring in said recess engaging the valve stem, and interengaging parts on said valve stem and sleeve for effecting the simultaneous rotation thereof, without interfering with the longitudinal movement of the valve stem through the sleeve, whereby by loosening said clamping member said sleeve may be rotatably adjusted, by turning the valve stem, without disassembling the parts.

In testimony whereof I affix my signature.

PHILIP HAAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."