Nov. 5, 1935. F. A. WATEROUS ET AL 2,019,804

HYDRANT DRAIN VALVE

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FIG. 1

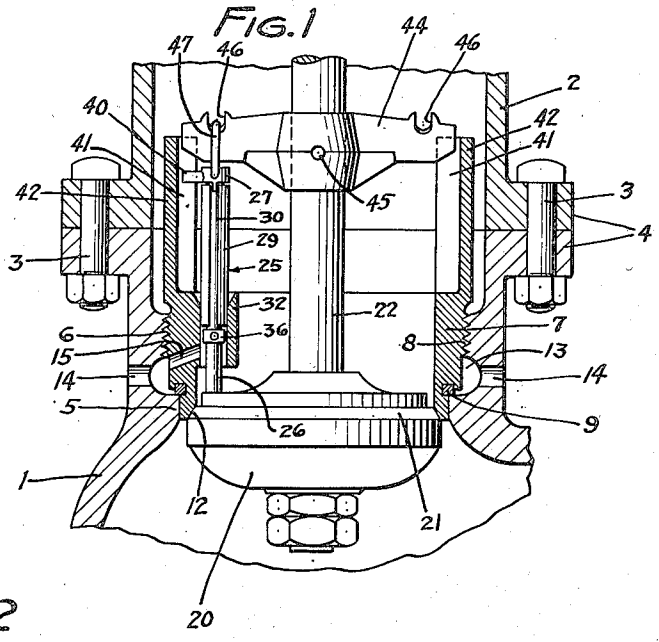


FIG. 2

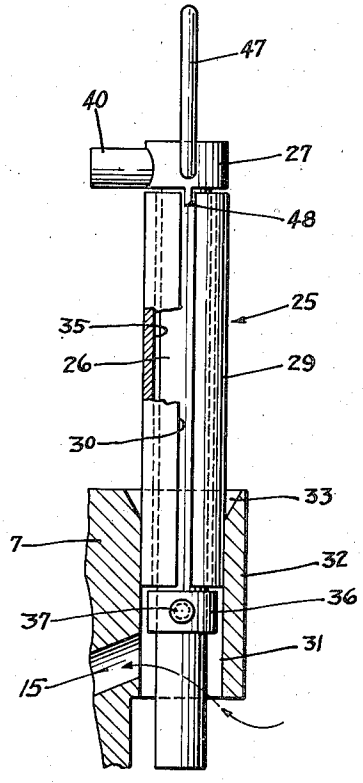
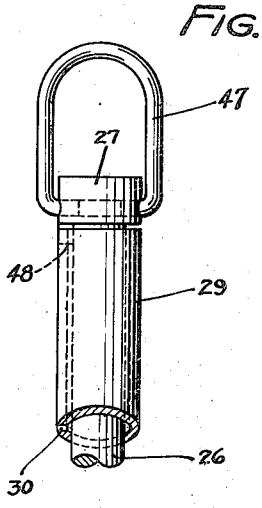


FIG. 3



Inventors
FREDERICK A. WATEROUS
RALPH R. BOYLES
By Paul, Paul & Moore
ATTORNEYS

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FIG. 4

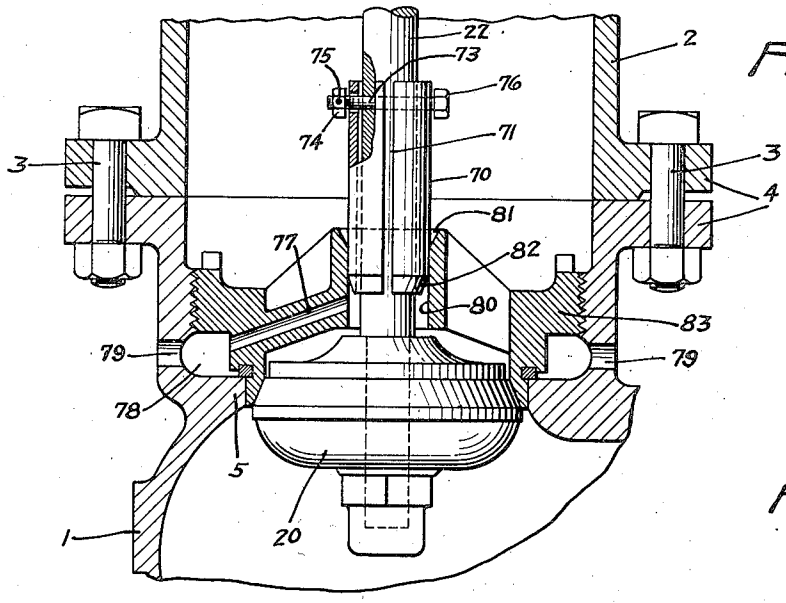


FIG. 5

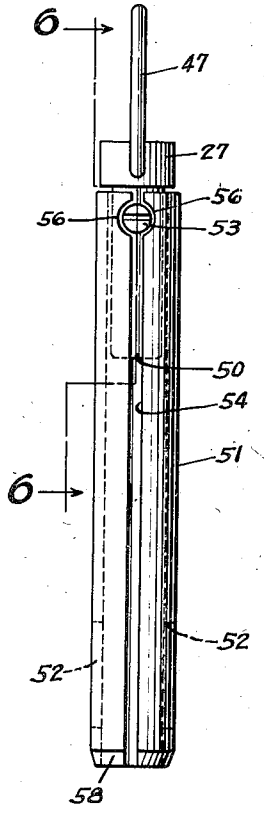


FIG. 6

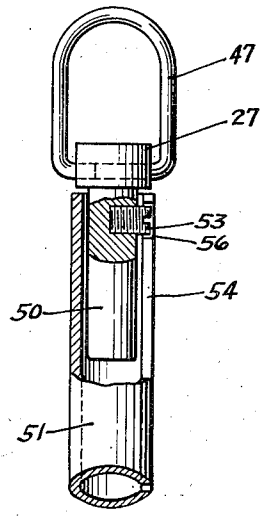


FIG. 7

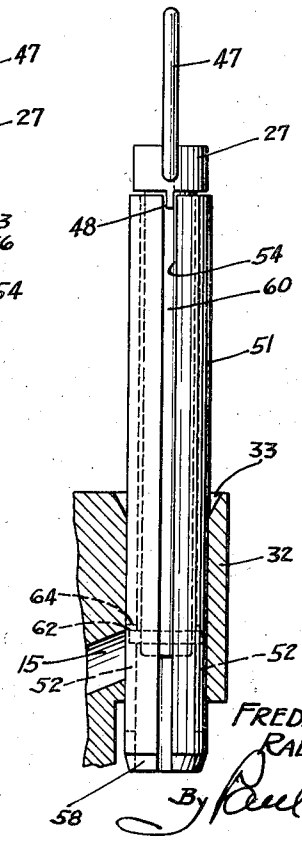
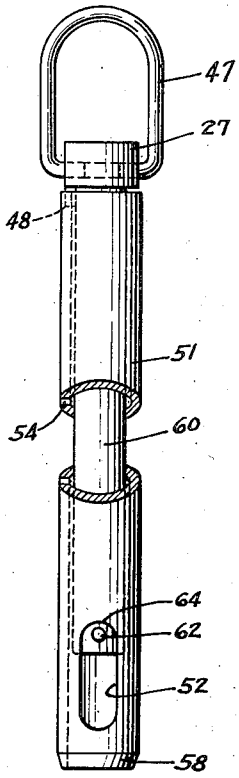


FIG. 8



Inventors
FREDERICK A. WATEROUS
RALPH R. BOYLES
By Reed, Roulf & Moore
ATTORNEYS

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2,019,804

HYDRANT DRAIN VALVE

Frederick A. Waterous and Ralph R. Boyles, St. Paul, Minn., assignors to Waterous Company, St. Paul, Minn., a corporation of Minnesota

Application June 5, 1935, Serial No. 25,112

11 Claims. (Cl. 137—13)

This invention relates generally to improvements in hydrants and the like and particularly to an improved drain valve mechanism. It is an object to improve that portion of the mechanism known as the plunger, which as a valve member is adapted to slide vertically in the bore of a seat ring to control a waste water outlet port. The invention is an improvement in drain valve mechanism over that shown in Patent Number 1,605,624, to L. P. Storey for Hydrant.

This application is a continuation in part of the copending application, Serial Number 584,158, of Frederick A. Waterous and Ralph R. Boyles, for Hydrant drain valves.

The main object of the present invention is to provide means for automatically compensating for changes in the diameter of the drain plunger and/or the seat or bore in which it slides, such changes being occasioned by wear, accretion or corrosion. The practice of the present invention provides a device in which the valving action is properly maintained and in which the plunger does not bind or stick or become loose in its bore or seat.

Features of the invention include the constructional details illustrated as well as the broader ideas of means by which a plunger of this character is made automatically constrictable and expansible for the purposes set forth.

Objects, features and advantages of the invention will be set forth in the description of the drawings forming a part of this application, and in said drawings

Figure 1 is a vertical section through the lower portion of a hydrant showing the main valve closed and the drain valve open;

Figure 2 is an elevation partly in section further illustrating the drain plunger of Figure 1 and showing the valve in open position;

Figure 3 is a fragmentary elevation viewing the upper part of the device of Figure 2, from the right side;

Figure 4 is a vertical section through the lower part of a hydrant, showing a modified embodiment of the invention;

Figure 5 is a side elevation of a third form of the invention;

Figure 6 is a sectional elevation of the upper portion of the construction of Figure 5, taken approximately on line 6—6 of that figure;

Figure 7 is a fragmentary view of a third form of the invention showing the same closing the drain passage of the hydrant; and

Figure 8 is an elevation partly in section, viewing the device of Figure 7 from the right side.

Referring to the drawings and to Figure 1: Numeral 1 indicates the base casting or shoe. The upper portion of the base is connected to the body 2 in the usual manner, as by bolts 3, passing through flanges 4. The base is provided internally with an annular flange 5 and is threaded as at 6.

The valve seat ring is indicated at 7 and has threads 8 cooperating with the threads 6. Packing 9 is provided and by means of the threads the packing is securely clamped against the flange 5 thereby providing a watertight joint. An annular valve seat 12 is provided at the lower end of the ring 7. The shoe has an internal annular groove 13 forming with the side of the ring, a circumferential passage, communicating with outwardly leading radial drain passages 14. The ring 7 is provided with a drain passage 15 leading downwardly to the circumferential passage. The main valve 20 is adapted to cooperate with the seat 12 and preferably has a leather ring as a seat-engaging portion 21. The valve stem or spindle is indicated at 22, and means is provided for preventing rotation of the stem.

One form of control plunger is generally indicated at 25 and this plunger comprises a solid rod 26, provided at its upper end with a head 27 as part of means for causing the sleeve to move with the rod. The shank portion or rod 26 is surrounded by a split sleeve 29. This split sleeve 29 may be considered a tubular member having a slot 30 extending its full length longitudinally. Normally the outer diameter of this tube is such as to perform a valving action when inserted as shown in the bore 31 of the integral lug 32 of the seat ring 7. The upper part of the bore is reamed out as at 33 to facilitate introduction of the sleeve 29.

The inner diameter 35 of the sleeve, see Figure 2, is slightly greater than the diameter of the rod 26 and, after assembly, is spaced from the rod as shown. The purpose is to maintain the sleeve 29 in compressible or collapsible condition, and also in an expansible condition so that it may change its outside diameter. During assembly the sleeve is forcibly constricted by introduction into the bore, and thereby conditioned to change its diameter to insure watertightness and wear takeup and compensate for changes due to mechanical or chemical causes.

Another part of the means for causing the sleeve to move with the rod is a collar 36 the outer diameter of which is substantially less than that of the bore 31. The collar is suitably secured by cross pin 37. Inasmuch as the diameter

of the rod is substantially less than the diameter of the bore from which the drain passage leads the waste water can, when the sleeve uncovers the passage 9, easily reach the drain passage from a point below the lug 32 by passing upwardly in direction of the arrow.

The head 27 is provided with a guide pin 40 to prevent axial rotation of the rod 26 such as would allow the slot 30 to register with the drain passage 9, and this pin engages a slot 41 in a guide extension 42 rising from the seat ring 7. There are two of these guide extensions 42 diametrically arranged as shown, and the guide slots 41 slidably receive cross-arm 44 pinned to the valve stem 22 as at 45. This guiding of the cross arm prevents such rotation of the main valve stem 22, as would interfere with the proper operation of the drain valve plunger. This cross arm has suitable notches 46 and the rod 26 has a bail 47 engaging in one of the notches 46 to act during assembly to prevent accidental dropping of the plunger into the shoe as may occur if the valve stem is canted too much. It is noted that the lower end of the rod 26 is engaged by the valve 20 and that the head 27 is engageable by the cross arm. Means is thus provided for moving the drain valve back and forth as the valve is moved. This movement of the drain plunger as a result of valve movement may of course be accomplished in other ways and there is no intention to be entirely limited to the manner of moving the rod.

In order to prevent such rotation of the sleeve 29 on the rod as would permit the slot 30 to register with the drain passage 9, the head 27 and rod are provided with a fin 48 which extends into the slot 30 as shown in Figures 1 and 2. The width of this fin is less than the width of the slot so as not to prevent proper constriction of the sleeve during introduction into the bore, nor proper constriction thereafter. It will be noted that after introduction, there is a space between the sides of the fin 48 and the sides of the slot 30. Thus allowance is made for additional compensatory constriction.

In Figures 5 and 6 is shown a modification in which the rod 50 extends only a short distance into the sleeve 51 and in which the sleeve has diametrically related longitudinally extending drain slots 52, adjacent the lower end. One of these slots is adapted to register with the passage 15, see Figure 7, and both extend below the lower end of the lug 32, when the drain valve is in valve-open position.

In this instance rotation of the sleeve on the rod is prevented by a pin or screw 53 the diameter of the pin being greater than the width of the slot 54 and the sides of the slot being recessed as at 56. By this means a single pin prevents longitudinal as well as rotative motion of the sleeve. The lower end of the sleeve is beveled as at 58 to facilitate introduction into the bore, the bore being beveled at the upper end as at 33.

In Figures 7 and 8 is shown another modification in which the rod 60 extends a greater distance into the sleeve 51 but does not extend entirely therethrough. This sleeve has the slots or openings 52 as in the form of Figure 5. The sleeve is beveled as at 58. In this instance the head 27 has the fin 48 fitting in the slot 54 as for the form shown in Figures 1, 2 and 3. The rod has a cross pin 62 arranged at the level of and adapted to engage the upper end walls 64 of the slots 52, the head and pin acting to prevent lengthwise motion of the sleeve on the rod.

It will be noted that in the form of Figure 2 the head 27 and the collar 36 provide this motion-preventing means while in Figure 5 the screw performs the dual function of preventing rotation and translation of the sleeve, while in Figure 7 the head 27 and the pin 62 perform this function.

In Figure 4 is shown another modification in which the sleeve 70 is mounted directly on the valve stem 22. This is a valuable and very efficient and simple construction, involving the split-sleeve principle as applied to drain passage control. The drawings show the drain valve in open position with the main valve closed. The slot in the sleeve is indicated at 71 and the means for causing the sleeve to move with the rod and to prevent rotation of the sleeve has herein the form of a headed bolt 73 passing diametrically through the sleeve and stem and having a nut 74 held against rotation by pin 75. It is noted that the head 76 and the nut 74 are spaced to allow the expansion of the sleeve, after assembly. It will also be noted that the inner surface of the sleeve is spaced from the outer surface of the rod after assembly. In this instance the seat ring 83 is slightly modified in form, and has an elongated drain passage 77 leading to the circumferential passage 78 which in turn delivers through the radial openings 79 to the outside of the pump base. The bore for the drain valve is indicated at 80 and is beveled as at 81, the lower end of the sleeve being correspondingly beveled at 82.

It will be noted that in all forms of the invention the rod is adapted to move when the valve moves and therefore the sleeve is adapted to move when the valve moves. In all forms of the invention the sleeve provides for proper compensation under all conditions of use. In all forms, except that of Figure 4, the drain valve is pushed upwardly by the valve and downwardly by the cross arm or its equivalent. In Figure 4 of course the stem only controls the split sleeve.

Insofar as we are aware no one has before arranged a drain valve directly on the main valve stem.

We claim as our invention:

1. A hydrant having a main valve, and having a bore having a waste water port leading therefrom, a rod and means by which it is moved when the valve moves, a sleeve surrounding the rod and slidable in the bore, means weakening the sleeve to make it constrictable, said sleeve being forcibly constricted by assembly introduction into the bore to remain permanently therein, means for causing the sleeve to move with the rod, the sleeve being so related to the drain passage that it closes the passage when the valve opens and opens the passage when the valve closes.

2. A hydrant having a valve, and having a bore having a waste water port leading therefrom, a rod and means by which it is moved when the valve moves, a split sleeve loosely surrounding the rod and slidable in the bore, means for causing the sleeve to move with the rod without rotation on the rod, said sleeve being forcibly constricted by assembly introduction into the bore to remain permanently therein and thereby conditioned to change its diameter to insure water tightness and wear takeup and compensate for changes due to mechanical or chemical causes, the sleeve being so related to the drain passage that it closes the passage when the valve opens and opens the passage when the valve closes.

3. A hydrant having a main valve and stem therefor, and having a bore having a waste water

port leading therefrom, a sleeve surrounding the rod and arranged in valving relation with said bore and passage, means weakening the sleeve to make it constrictable, said sleeve being forcibly constricted by assembly introduction into the bore, means for causing the sleeve to move with the rod, the sleeve being so related to the drain passage that it closes the passage when the valve opens and opens the passage when the valve closes.

4. A hydrant having a main valve having a valve stem, and having a bore and a waste water port leading therefrom, and a split sleeve on and movable with said stem and in expanding and permanent valving relation with said bore and passage, said sleeve being forcibly constricted by assembly introduction into the bore, the sleeve being adapted to close the drain passage when the valve opens, and open said passage when the valve closes.

5. A hydrant having, a valve having a stem, said hydrant having a bore having a waste water port leading therefrom, a split sleeve loosely surrounding the stem and slidable in the bore, means causing the sleeve to move with the stem, said sleeve being forcibly restricted by assembly introduction into the bore to remain permanently therein and thereby conditioned to change its diameter to insure water tightness and wear takeup and compensate for changes due to mechanical or chemical causes, the sleeve being so related to the drain passage and bore that it closes the passage when the stem moves to open the valve and opens the passage when the stem moves to close the valve.

6. A hydrant having a valve and having a bore into the bottom end of which water above the valve can enter, said bore having a waste water port leading therefrom, a rod and means by which it is moved when the valve moves, a split sleeve loosely surrounding the rod and slidable in the bore, means for causing the sleeve to move with the rod, said sleeve being forcibly constricted by assembly introduction into the bore and thereby conditioned to change its diameter to insure water tightness and wear takeup and compensate for changes due to mechanical or chemical causes, the bottom of the sleeve being so related to the drain passage and bore that it closes the passage when the valve opens and opens the passage as the valve closes, and the lower end of said rod being engageable by the valve to be moved to drain-open position as the valve closes.

7. A hydrant having a valve and stem therefor, said hydrant having a bore having a waste water port leading therefrom, a rod traversing the bore, means by which the stem moves the rod in drain-valve-closing direction, a split sleeve loosely surrounding the rod and slidable in the bore, means for causing the sleeve to move with the rod and prevent rotation of the sleeve on the rod, said sleeve being forcibly constricted by assembly introduction into the bore and thereby conditioned to change its diameter to insure water tightness and wear takeup and compensate for changes due to mechanical or chemical causes, the rod being moved by the main valve in drain-valve-opening direction, the sleeve being so related to the drain passage and bore that it closes the passage when the valve opens and opens the passage as the valve closes.

8. A hydrant having a valve, and having a bore having a waste water port leading therefrom, a rod and means by which it is moved when the valve moves, a split sleeve loosely surrounding the rod and slidable in the bore, said sleeve having an opening adapted to register with the drain passage, a pin and means by which it cooperates with the rod and sleeve to prevent longitudinal and rotative movements of the sleeve on the rod, said sleeve being forcibly constricted by assembly introduction into the bore, the sleeve opening being so related to the drain passage that it moves out of register with the passage when the valve opens and moves into register when the valve closes.

9. A hydrant having a valve and having a bore having a waste water port leading therefrom, a rod and means by which it is moved when the valve moves, a split sleeve loosely surrounding the rod and slidable in the bore, said sleeve having an opening adapted to register with the drain passage, means for causing the sleeve to move with the rod and prevent rotation of the sleeve on the rod including a pin extending through the rod and entering the opening, said sleeve being forcibly constricted by assembly introduction into the bore and thereby conditioned to change its diameter to insure water tightness and wear takeup and compensate for changes due to mechanical or chemical causes, the sleeve opening being so related to the drain passage that it moves out of register with the passage when the valve opens and moves into register when the valve closes.

10. A hydrant having a drain valve having a bore having a waste water port leading therefrom, a rod and means by which it is moved when the valve moves, a sleeve having a slot extending its full length longitudinally, said sleeve loosely surrounding the rod and slidable in the bore, said sleeve having an opening adapted to register with the drain passage, means for causing the sleeve to move with the rod and prevent rotation thereof on the rod, including a screw extending through said slot, said sleeve being forcibly constricted by assembly introduction into the bore and thereby conditioned to change its diameter to insure water tightness and wear takeup and to compensate for changes due to mechanical or chemical causes, the sleeve opening being so related to the drain passage that it moves out of register with the passage when the valve opens and moves into register when the valve closes.

11. A hydrant having a main valve having a valve stem and having a valve seat ring, said ring having a bore through which the valve stem passes, said bore having a waste water port leading therefrom through the seat ring, a sleeve loosely surrounding the rod and slidable in the bore, means weakening the sleeve to make it constrictable, said sleeve being forcibly constricted by assembly introduction into the bore to remain permanently therein, said sleeve being substantially non-translatably secured to the rod, the sleeve being so related to the drain passage that it closes the passage when the valve opens and opens the passage when the valve closes.

FRED. A. WATEROUS.
RALPH R. BOYLES.