R. H. THORNE & F. J. MILLER.

FIRE HYDRANT.

APPLICATION FILED AUG. 13, 1918.

1,296,714.

Patented Mar. 11, 1919.

3 SHEETS—SHEET 1.

Fig. 1.

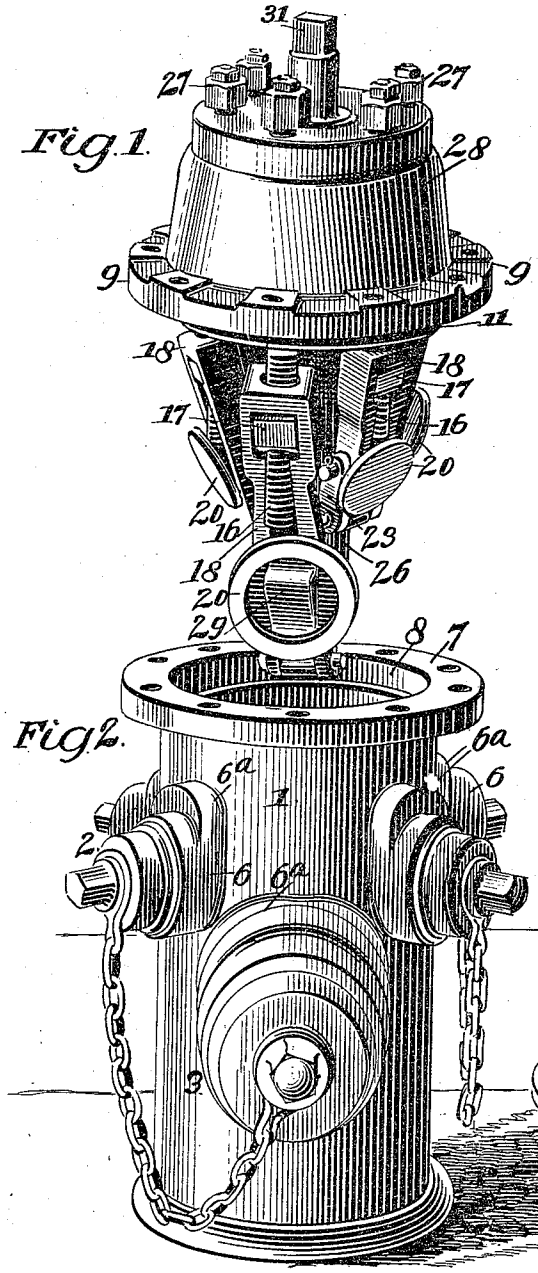
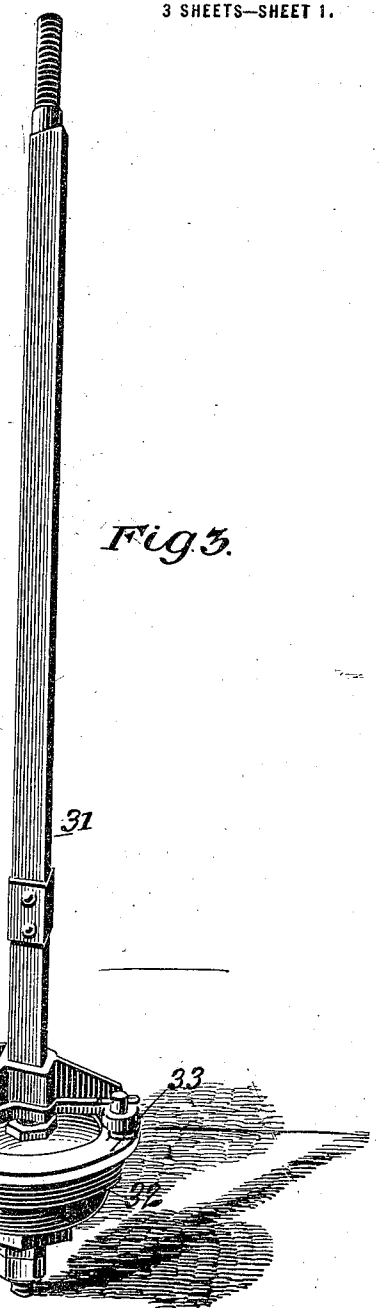


Fig. 2.

Fig. 3.



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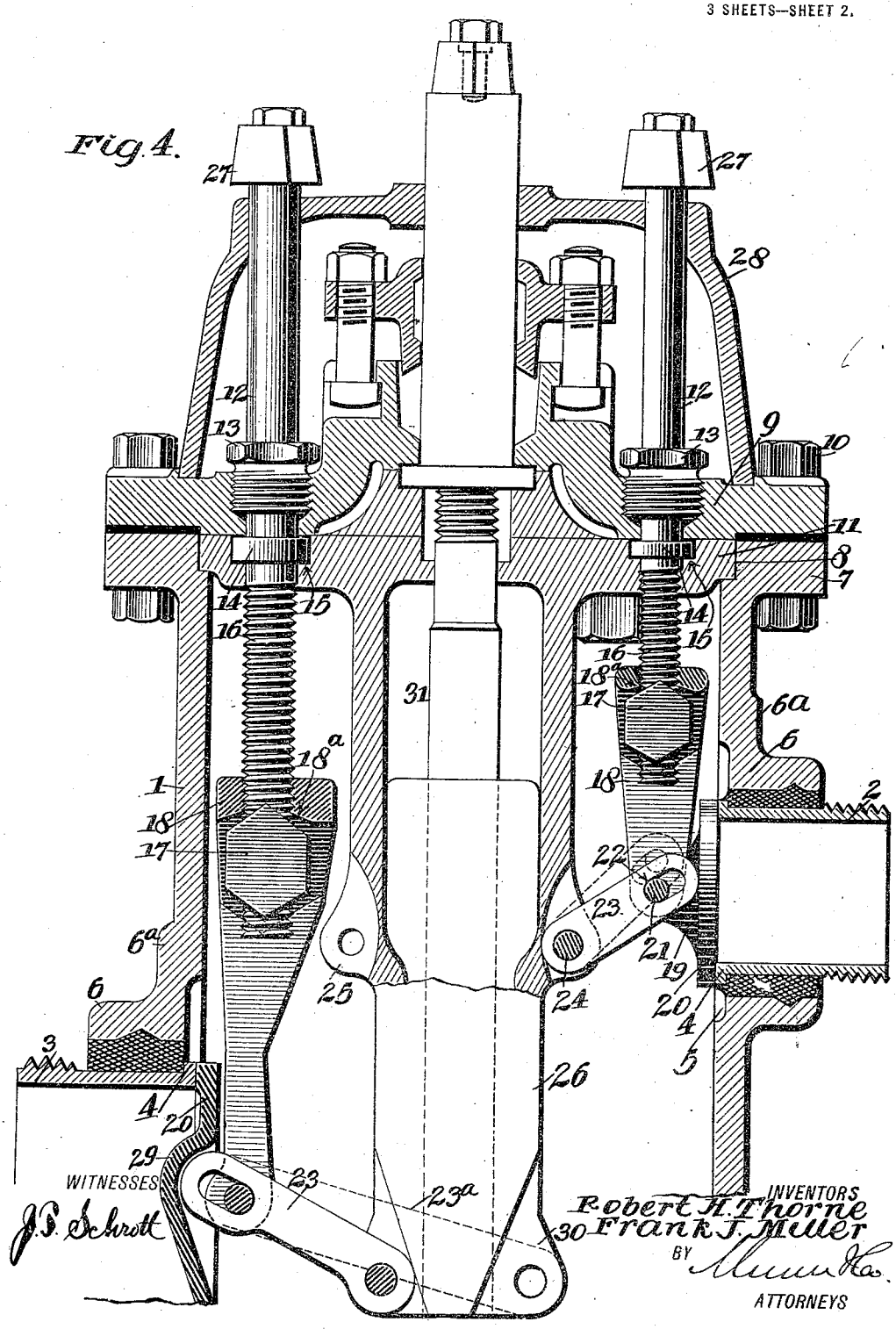
3 SHEETS—SHEET 2.

Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

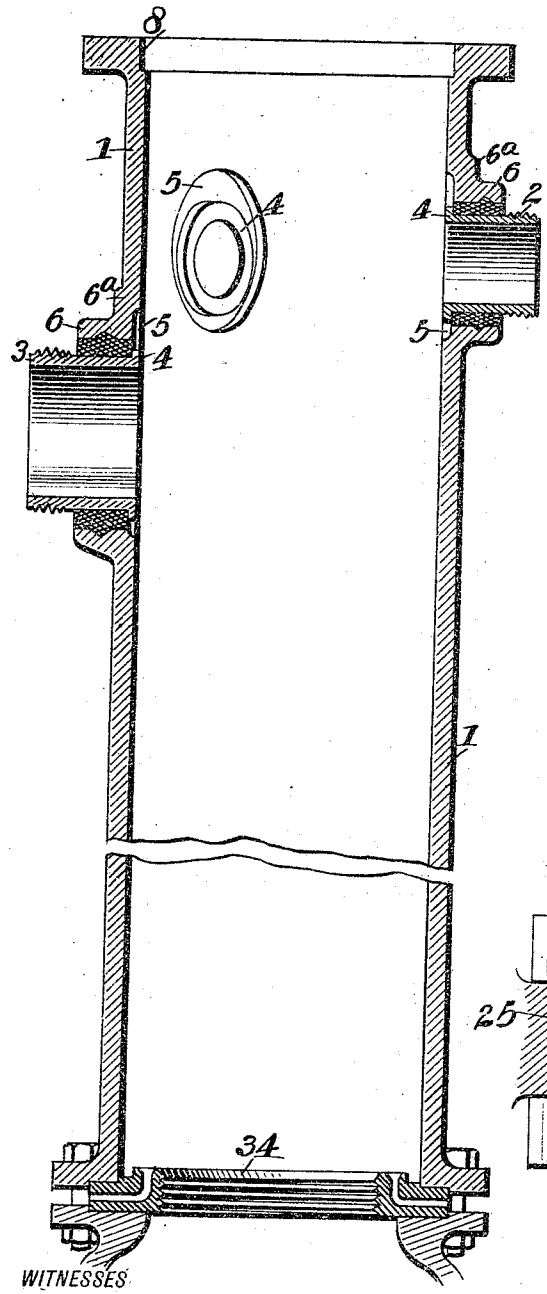


Fig. 6.

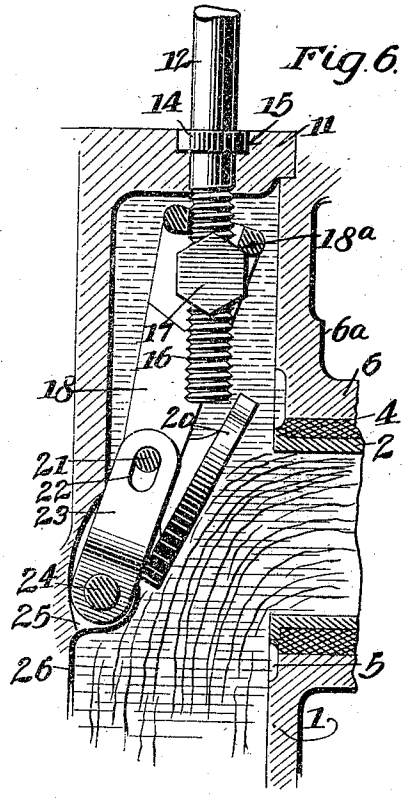
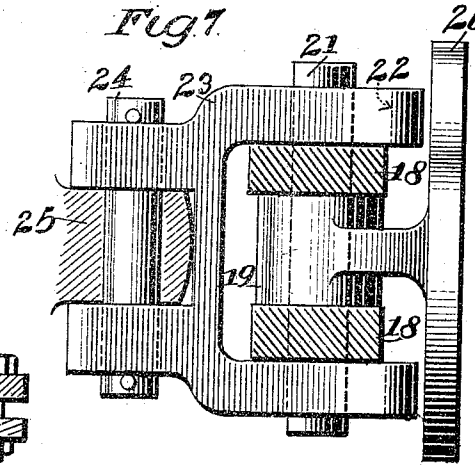


Fig. 7.



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FIRE-HYDRANT.

1,296,714. Specification of Letters Patent. Patented Mar. 11, 1919.

Application filed August 13, 1918. Serial No. 249,722.

To all whom it may concern:

Be it known that we, ROBERT H. THORNE and FRANK J. MILLER, citizens of the United States, and residents of Williamsport, in the county of Lycoming and State of Pennsylvania, have invented certain new and useful Improvements in Fire-Hydrants, of which the following is a specification.

Our invention relates to improvements in fire hydrants, it being more particularly in the nature of an improvement in hydrants of the removable seat and working part type, and it consists in the constructions, combinations and arrangements herein described and claimed.

An object of our invention is to provide a fire hydrant of the inside cut-off type, wherein the main valve, the main valve seat and all other operating parts may be taken out after simply removing the cap at the top, the stand pipe or barrel of the hydrant having a bore of such a construction that there are no inwardly projecting parts to obstruct the removal of the mechanisms referred to.

Another object of the invention is to provide a fire hydrant having valves with operating mechanism which is so arranged that the valve is first slid a short distance across the valve seat to form a slight opening and initially release the pressure on the valve, and subsequently to fold the valve backwardly thereby giving an unobstructed flow to the water and causing the valve to act as a deflector.

A further object of the invention is to provide operating mechanism for each of the valves, the arrangement of the mechanism being such that upon turning the valve stem to raise or open the valve, no lateral strain is imposed on the stem tending to distort it and throw it out of alinement.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings in which:

Figures 1, 2 and 3 are perspective views illustrating the various operating parts of the hydrant separated,

Fig. 4 is a sectional view of the upper portion of the stand pipe or barrel,

Fig. 5 is a detail sectional view of the stand pipe or barrel showing the uniform and unobstructed bore,

Fig. 6 is a detail sectional view showing one of the valves open, and

Fig. 7 is a detail cross section on the line 7—7 of Fig. 4.

In carrying out our invention, we provide a stand pipe or barrel 1 which has a plurality of hose nozzles 2 radiating therefrom, and one or more steamer nozzles 3 arranged below the hose nozzles. Each of the nozzles, it will be observed more particularly in Fig. 4, is in the nature of a bushing which is provided with a flange 4 on the inner end. The flange 4 in each instance is set in a recess 5 in the bore of the stand pipe. The purpose of this arrangement is to bring the inner end of each of the nozzles flush with the bore of the stand pipe so that there will be no projecting part on the inside to form an obstruction when it is desired to remove the operating parts.

A boss 6 for each of the recesses 5, is built on the adjacent wall of the stand pipe and includes a thickened portion 6^a which is intended to compensate for the amount of metal taken off of the stand pipe at the recess 5. There is thereby no sacrifice of the mechanical strength of the stand pipe adjacent to the various nozzles, by reason of the provision of the recesses on the inside, since these recesses are compensated for as just explained, by the added thickness of metal 6^a above each of the bosses 6. A flange 7 surrounds the upper edge of the stand pipe 1, and an annular recess 8 is formed on the inside to receive and partly act as a support for portions of the inserted mechanism.

Mounted on top of the stand pipe 1 is a packing plate 9 which is secured in place on the flange 7 by bolts 10. A thrust plate 11 is secured beneath the packing plate 9, and the thrust plate rests in the annular recess 8 when the parts are assembled as shown in Fig. 4.

A stem 12 passes through a packing gland 13 which is screwed in the packing plate 9, and extends into the space beneath the thrust plate 11. The stem 12 has a collar 14 which operates in a recess 15 in the thrust plate and the arrangement thus provided permits of the turning of the stem 12 and yet prevents longitudinal movement of the stem. The lower end of the stem 12 is threaded at 16 and carries a centering nut 17 upon which the yoke 18 is supported.

The yoke 18 is in the nature of a U-shaped member, the arms of which straddle a lug

19 of a valve 20. There is one of the valves 20 for each of the nozzles 2 and 3 and the construction of the operating parts of all of the hose nozzles and valves is the same. The operating mechanism for the valve of the steamer nozzle is also the same, but there is a slight difference in the construction of the valve itself, which will be explained later.

A pin 21 passes through the lug 19, the arms of the yoke 18, and through a slot 22 in each of the pair of arms of a toggle link 23. The toggle link 23 is pivoted at 24 in a suitable support 25 of an extension post 26 which is pendent on the thrust plate 11. The centering nut 17 is pointed at both ends and the bridge portion of the yoke 18 has outwardly sloping surfaces 18ª which are formed at a greater angle than are the corresponding surfaces of the sharpened portions of the centering nut 17.

The construction just described provides a knife edge upon which the yoke 18 is supported, and this edge enables the necessary amount of rocking motion that the yoke 18 has with respect to the centering nut 17 with a minimum amount of friction. The stem 12 has an operating nut 27 at the top and on the end which is exposed beyond the cap 28 which covers the packing plate 9 as shown. On turning the nut 27 in the proper direction, the centering nut 17 is elevated. The yoke 18 is carried therewith until the pin 21 reaches the extremity of the slot 22 in the arms of the toggle link 23. During this portion of the initial movement in opening the valve 20, the valve 20 is caused to slide vertically across the nozzle 2. This initial sliding movement of the valve forms a slight opening at first through which the water may pass and relieve the load on the valve.

As the valve opens farther, more water will pass out and when the pin 21 reaches the extremity of the slot 22, the end of the vertical sliding movement of the valve 20 comes to an end. Continued turning of the stem 12 causes the yoke 18 to turn on the knife edge of the centering nut 17 until the yoke 18 and the toggle link 23 finally assume the position indicated in Fig. 6 when the valve 20 is fully opened. Here it will be observed that the valve 20 assumes a position at an angle with respect to the nozzle 2. This angled position of the valve 20 provides a deflector for the water which directs it toward the nozzle.

One of the principal features of the invention and relating more directly to the mechanism just described, consists in the cooperative arrangement of the valve opening parts whereby the opening of the valve is achieved without imposing lateral strains on the valve stem 12. The valve stem 12 always remains in the true perpendicular position and it has been found in actual practice that no lateral strains are imposed on the valve stem and consequently there is no wear on the collar 14 nor on the packing in the gland 13 to cause a leakage of the water past these portions into the cap 28.

The same mode of operation and the same construction of the parts relate to the valve of the steamer nozzle 3. The valve 20 of the steamer nozzle is, however, slightly different in construction in that it is provided with a depression 29 in which the end of the toggle link 23 operates. The recess in the valve 20 is used principally where the stand pipe 1 is of such a small diameter of bore that a toggle link 23 of sufficient length cannot be employed to obtain the proper results. By providing the depression 29 the end of the toggle link may be made to swing beyond the valve as clearly shown in Fig. 4, and thus the coacting mechanism may be properly mounted to obtain the proper leverage and clearance necessary.

In other circumstances where it is found that the valve 20 more particularly in connection with the steamer nozzle 3, does not have sufficient room to swing, a longer toggle link 23ª may be employed and connected to a lug 30 on the opposite side of the lower end of the extension post 26 as indicated in dotted lines in Fig. 4. It is to be observed that the wedging mechanism of the valve 20 cannot swing beyond the dead centers in either direction. Consequently, the parts are prevented from locking and becoming inoperative.

Reaching from the top to the bottom of the hydrant is a main valve rod 31 to the lower end of which a valve 32 is secured. The valve 32 operates against a seat in a cage 33. The cage has threads and is arranged to be screwed in place in a ring 34 which is clamped between the flanged end of the stand pipe 1 and the hydrant bottom.

Attention is directed more particularly to Fig. 5 wherein is shown the construction of the stand pipe or barrel 1, whereby the accomplishment of some of the most important features of the invention is made possible. As explained before, the nozzles 2 and 3 are mounted in place in the recesses 5 so that the inner ends of the nozzles come flush with the bore of the stand pipe and do not offer obstruction as is universally the case in hydrant constructions as they are now generally known. The annular recess 8 at the top provides a rest for the thrust plate 11 without thickening the stand pipe at the top to provide the necessary support for the thrust plate, and thus again contributing toward one of the objects of the invention.

The bore of the stand pipe 1 is substantially uniform from the bottom to the top. This bore is free from obstructions and there-

fore the removal of the valve mechanism at the bottom is enabled.

By screwing the various yokes 18 up to the position indicated in Fig. 6 so that the various valves 20 are folded against the extension post 26, as shown in Fig. 1, the mechanism pendent from the packing plate 9 may be taken out as a unit by simply removing the bolts 10 which normally hold the packing plate in place on the stand pipe. Should any of the operating parts become worn or out of alinement for any reason, the removal of the packing plate 9 enables the inspection of the entire working mechanism still avoiding the necessity of digging up the hydrant. This is particularly true in respect to the main valve at the bottom. Here the construction is such that by simply turning on the main valve rod 31, and unscrewing it, the entire valve seat 33, together with the valve and drip, may be taken out. Usually the valve and drip are fixed in place at the bottom and in a position so inaccessible that they can only be reached by digging up the entire hydrant.

The operation of closing the valve 20 is practically the same as that of opening it. In closing, the valve 20 reaches a point directly opposite the seat of the nozzle 2, and upon continued movement of the yoke 18, the ends of the arms of the toggle link 23 bear against the valve 20 and wedge it tightly against the seat. In the closing movement just referred to, the lower sharpened portion of the centering nut 17 engages a wedge shaped seat which is similar to the seat 18^a. This second seat is well indicated in Fig. 4, from which it will be readily understood that it is necessary for the centering nut 17 to bear down on the yoke 18 in order to accomplish the closing of the valve 20 in the manner just explained.

While the construction and arrangement of the fire hydrant as herein described and illustrated, is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

We claim:—

1. In a fire hydrant, a stand pipe having a recess depressed in the wall of the bore, a thickened portion on the outside compensating for the recess and providing an even thickness of wall, said thickened portion having a nozzle opening, and a nozzle in said opening, having a flange forming a valve seat, occupying said recess, said valve seat being flush with the wall of the bore and enabling the maintenance of an unrestricted passage through the stand pipe.

2. In a fire hydrant, a stand pipe having a recess depressed in the wall of the bore, a valve and valve operating mechanism supported in the bore, a boss formed on the outside of the stand pipe adjacent to the recess to compensate therefor and provide a uniform thickness of wall, and a nozzle projecting through the boss, having a flange occupying said recess and forming a seat for the valve, said valve seat being flush with the surface of the bore, providing an unrestricted passageway in the stand pipe, and enabling the removal of the valve and its operating parts through the top of the stand pipe.

3. In a fire hydrant, a stand pipe having a plurality of nozzles flush on the inside with the bore, a packing plate secured to the stand pipe and forming a closure for the bore, valves and valve operating mechanism coöperating with the nozzles, and a combined thrust plate and extension post supported on the packing plate and providing a rigid mounting for the valve operating mechanism.

4. In a fire hydrant, a stand pipe having nozzles provided with flanges forming valve seats occupying positions flush with the surface of the bore of the stand pipe, a packing plate secured to the stand pipe and forming a closure for the bore, a thrust plate and extension post pendent from the packing plate, and valves carried by said extension post and being foldable thereagainst for the removal of the packing plate and its carried parts.

5. In a fire hydrant, a stand pipe having a nozzle formed with a flange, providing a valve seat, said valve seat being depressed in the surface of the bore to leave an unobstructed passage, a packing plate secured on the stand pipe and forming a closure for the bore, a thrust plate and extension post pendent from the packing plate, said thrust plate having a recess, a valve stem passing through the packing plate and thrust plate and having a collar occupying said recess, a packing gland for the stem, a threaded portion on the lower end of the stem, a valve coacting with the valve seat, and means in connection with said valve and the extension post, operated by the valve stem to secure an initial sliding movement of the valve across the valve seat to release the water pressure on the valve, and a subsequent folding movement of the valve to bring it into a deflecting position.

6. In a fire hydrant, a stand pipe having a nozzle formed with a flange, providing a valve seat, said valve seat being depressed in the surface of the bore to leave an unobstructed passage, a packing plate secured on the stand pipe and forming a closure for the bore, a thrust plate and extension post pendent from the packing plate, said thrust plate having a recess, a valve stem passing through the packing plate and thrust plate and having a collar occupying said recess, a packing gland for the stem, a threaded por-

tion on the lower end of the stem, a valve coacting with the valve seat, a toggle link pivoted to the extension post and having a slot and pin connection with the valve, a yoke joined to the pin connection and having a bridge with a wedge surface, and means carried by the threaded end of the stem including a centering nut having a knife edge engaging the wedge surface of said bridge.

7. In a fire hydrant, a valve stem having a threaded end, means providing a mounting for said stem, enabling the rotation thereof and preventing longitudinal movement, a valve arranged to be actuated by said stem, a pivoted toggle link mounting for said valve, and means carried by said valve stem and in connection with said valve, enabling the opening and folding back of said valve without imposing lateral strain on said valve stem.

8. In a fire hydrant, a valve stem having a threaded end, means providing a mounting for said stem, enabling the rotation thereof and preventing longitudinal movement, a valve arranged to be actuated by said stem, a pivoted toggle link mounting for said valve, means movable with the access of the valve stem upon turning thereof, and means supported on said valve stem carried means, in connection with the valve and said toggle link, to secure a swinging motion of said toggle link and said valve without imposing lateral strain on the valve stem.

9. In a fire hydrant, a rotatable valve stem having a threaded end, a nozzle having a valve seat, a valve resting on said seat, a pivoted toggle link having arms bearing said valve against the seat, the ends of said arms having slots, a lug on the valve located between said arms, a pin passing through the lug and said slots, a yoke having arms extending between said lug and the arms of said toggle link, a bridge included in said yoke having a wedge shaped surface and a hole for the passage of said valve stem, and a centering nut having a knife edge engaging said wedge shaped surface.

10. In a fire hydrant, the combination of a valve seat, a valve resting on said seat, and coöperating mechanism arranged to initially slide the valve across said seat forming a small opening for the relief of the water pressure on the valve, and subsequently to hold the valve back into a water deflecting position.

11. A fire hydrant comprising a stand pipe having an internally threaded ring clamped in place at the bottom, and a bore of a uniform and unrestricted diameter from said ring to the top, a plurality of recesses being formed in the wall of the bore near the top, bosses formed on the outside of the stand pipe to compensate for said recesses and preserve a uniform thickness of the stand pipe, nozzles projecting through said bosses including flanges forming valve seats occupying said recesses, said valve seats being flush with the bore of the stand pipe, a thrust plate forming a closure for the bore, valves and valve operating mechanism pendent from the thrust plate, and a main valve and valve seat occupying operating positions in said threaded ridge at the bottom, said main valve and valve seat, together with the thrust plate and its carried parts, being removable in the unobstructed passage provided in the bore of the stand pipe.

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