June 22, 1926.

1,589,696

G. HOLTZ

VALVE

Filed May 25, 1925

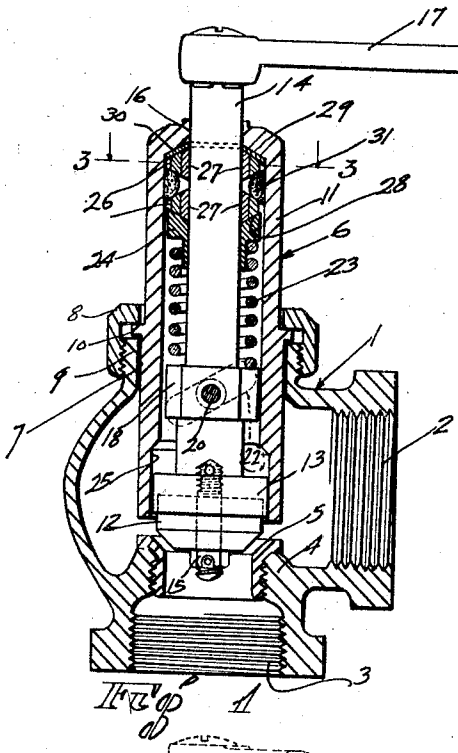


Fig. 1

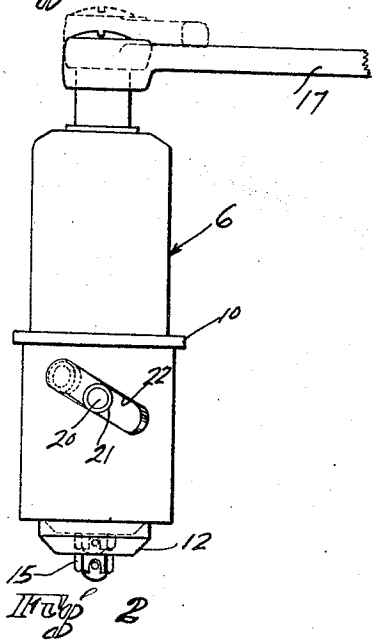


Fig. 2

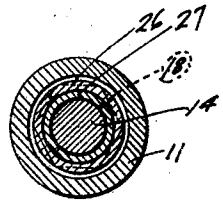


Fig. 3

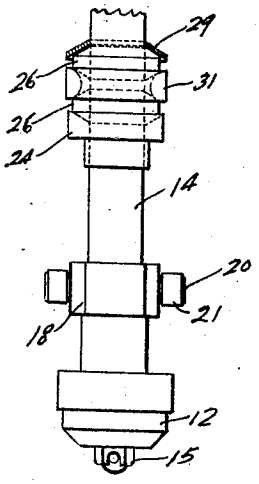


Fig. 4

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VALVE.

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This invention relates to an improved quick opening, self closing valve which, due to the special construction and relative arrangement of the parts thereof, will operate easily, smoothly, without appreciable wear and without leakage, under high as well as low pressures.

One of the purposes of the invention is to provide a valve of the character described which is simple as to construction, inexpensive, capable of being readily assembled and disassembled and which will require little or no attention or repair to maintain it in good working order.

The valve of this invention is characterized by a novel packing arrangement located interiorly of the valve stem housing and constituting a "floating" packing which is self compensating to provide a tight joint regardless of wear and which eliminates friction to an appreciable extent, the lasting qualities of the arrangement being a further point of advantage.

An additional feature of this invention comprises a small, compact, removable valve unit arranged in a specially constructed valve housing, which latter serves as a guide for the valve and stem, houses the valve lifting means, the valve closing spring and the packing arrangement and which also provides for a direct application of the pressure of the water on the valve in such manner as to tend to close the valve at all times whereby a quick and positive closing action is insured.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings, and set forth in the claims hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Referring to the drawing:

Fig. 1 represents a vertical sectional view of the valve of my invention showing it in open position.

Fig. 2 represents a side elevation of the valve parts as removed from the casing.

Fig. 3 represents a sectional view taken on the plane of line 3—3 of Fig. 1.

Fig. 4 represents a fragmentary side elevation of the valve, valve stem and packing arrangement, part of which latter is shown in section.

The embodiment of the invention shown in the accompanying drawing comprises a valve casing 1 having threaded intake and discharge openings 2 and 3 and provided between these openings with a web 4 having a removable valve seat 5 fitted thereto. The valve unit 6 extends into the casing through an opening 7 and is removably held in place by a flanged internally threaded collar 8 which screws onto a nipple 9 carried by the casing. This collar engages an annular flange 10 on the especially constructed cylindrical housing 11 of the valve unit, said flange also engaging the outer end of the nipple. This disposes the valve 12 in proper relation to its seat so that it may be seated and unseated while remaining in the lower end of the housing 11.

The valve 12 is removably secured in a cap 13 in the lower end of a valve stem 14, by a suitable fastening 15, the cap having a working or sliding fit within the lower end of the housing 11. The stem extends upwardly through an opening 16 in the upper end of the housing 11 and on its upper end has an operating handle or lever 17 attached thereto. The stem 14 has an enlargement 18 between its ends, which enlargement has a transverse hole 19 extending therethrough, in which a pin 20 is removably fitted. Antifriction rollers 21 are loosely mounted on the ends of the pin and engage in angularly disposed slots 22 formed in the housing 11. An expansion spring 23 is mounted on the stem and engages at its upper end a packing element supporting collar 24 on the stem and its its lower end engages the enlargement 18. The portion of the housing 11 having the slots 22 therein is spaced from the walls of the valve casing and water therefore enters the housing through said slots. Thus the pressure of the water is directly applied to the upper side of the valve in the housing 11 and tends to force the valve towards its seat at all times. The bore of the housing which receives the valve is enlarged as at 25 and the lower end of the valve is of less area than the upper end with the result that a greater force of the pressure is exerted on the upper side of the valve than on the lower side and the valve will seat positively and rapidly, aided by the fluid pressure.

The packing arrangement comprises two pairs of concentric packing rings surrounding the stem 14, each pair comprising an outer split ring 26 surrounding an inner sectional ring 27. The upper and lower edges of these rings are beveled and the lower pair of rings engage the upper beveled face 28 of the collar 24 whereas the upper pair of concentric rings rest upon the lower pair and engage a concavo-convex compressible, preferably rubber, washer 29 which in turn engage the beveled inner face of the upper wall 30 of the housing 11. Engaged between and with the opposed beveled edges of the pair of rings is a compressible, preferably rubber, ring 31 having a curved face engaging the beveled edges of the rings 26 and 27, and a straight flat face engaged with inner side of the housing 11. The pairs of rings 26 and 27 are in this way circumferentially spaced from the housing 11 although closely engaged with the stem 14. The rubber ring 31 forces the inner of the concentric rings into tight engagement with the stem. The spring 23 pressing upward on the packing rings causes the rubber ring 31 and concavo-convex rubber washer to compress and force the packing rings into close engagement with the stem at all times. These pressures on the packing rings cause them to be self adjusting and wear compensating thereby insuring a tight joint. The packing rings are preferably formed of some hard wear resisting packing material which will not set up appreciable friction. I find certain hard wood to be admirably suited, preferably lignum vitæ, because it wears slowly and smoothly and conforms closely to the stem.

When the valve handle is turned in the proper direction the anti-friction rollers 21 engaging in the oblique slots 22 cause the valve stem 14 to lift or move outward as it is rotated and thereby quickly and fully unseats the valve. This movement is against the action of the spring and pressure of the water in the housing 11 and when the operator releases the handle the spring 23 and water pressure exert a combined force which causes the valve to quickly and positively close.

The valve unit being contained in the housing 11 may be quickly and easily removed to renew the seat or inspect or repair the other valve parts. This unit is small, compact and capable of being readily assembled and disassembled.

The especially constructed packing insures a lasting and tight leak proof joint without setting up friction to the extent that the valve opening action is made objectionably hard or stiff.

I claim:

1. A valve comprising a casing having fluid intake and discharge openings, a seat between said openings, said casing having another opening therein, a valve unit extended through the last named opening and comprising a valve adapted to be moved towards and away from the seat, a tubular housing in which said valve has a working fit, means for moving the valve away from the seat, spring means for closing the valve, said tubular housing having openings therein permittng fluid to enter the housing and assist in closing the valve, packing means disposed within said housing and means for removably holding the housing in place.

2. A valve comprising a casing having intake and discharge openings and also provided with an additional opening, a valve seat within the casing between said intake and discharge openings, a tubular housing extended into the casing through the last named opening, a valve having a working fit in said housing, a valve stem extending upwardly from the valve through said housing, a handle on the upper end of the stem, said housing having angularly disposed slots, projections on the stem engaging in the slots, means for removably fastening the housing in place, an abutment on the stem, a collar loosely mounted on the stem, an expansion spring surrounding the stem with its ends engaged with said abutment and said collar and packing means interposed between the collar and upper end of the housing, which packing means surrounds said stem.

3. A valve comprising a casing having intake and discharge openings, a valve seat between said openings, a housing removably mounted within the casing, a valve having a working fit with the lower end of the housing and arranged to remain within said housing at all times, a valve stem extending upwardly from the valve through said housing, a handle connected to the upper end of the stem, projections extending from the stem, said housing having angularly disposed slots in which said projections engage through which slots fluid enters the housing whereby the pressure of the fluid will assist in closing the valve and spring means within the housing for urging the valve against its seat.

4. A valve comprising a casing having intake and discharge openings, a valve seat in the casing, a valve arranged to co-operate with the seat, a tubular housing extended into the casing in the lower end of which housing said valve has a working fit, a stem extending from the valve through the housing, means associated with the housing and stem for lifting the stem and valve on movement of the stem in one direction, spring means for urging the stem and valve in the other direction to close the valve, a collar mounted on the stem and being urged upwardly by the spring means, non-compressi-

ble packing rings surrounding and in close engagement with the stem between the collar and outer end of the housing, which rings are spaced circumferentially from the housing and a compressible packing ring engaging with and between said rings.

5. In a valve, a valve stem, a housing through which the stem extends, a collar loosely surrounding the stem, spring means yieldingly forcing the collar upwardly, two spaced apart split non-compressible packing rings having oppositely bevelled opposed faces which surround the stem between one end of the housing and the collar, said rings being circumferentially spaced from the housing, a compressible ring interposed between the outermost packing ring and the end of the housing and a compressible ring disposed between and in engagement with the bevelled opposed faces of said packing rings having a close fit against the inner side of the housing.

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