R. A. MILNE.

VALVE.

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1,173,728.

Patented Feb. 29, 1916.

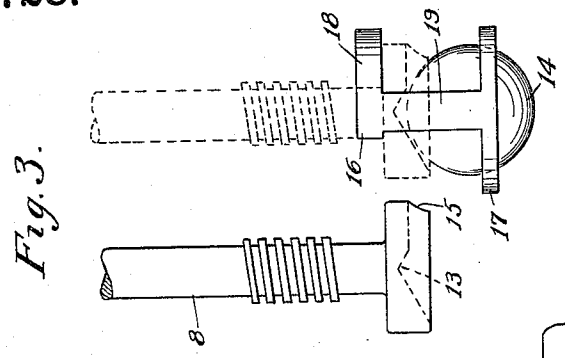


Fig. 3.

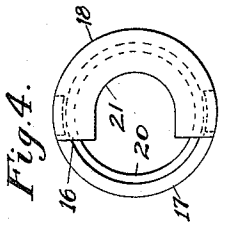


Fig. 4.

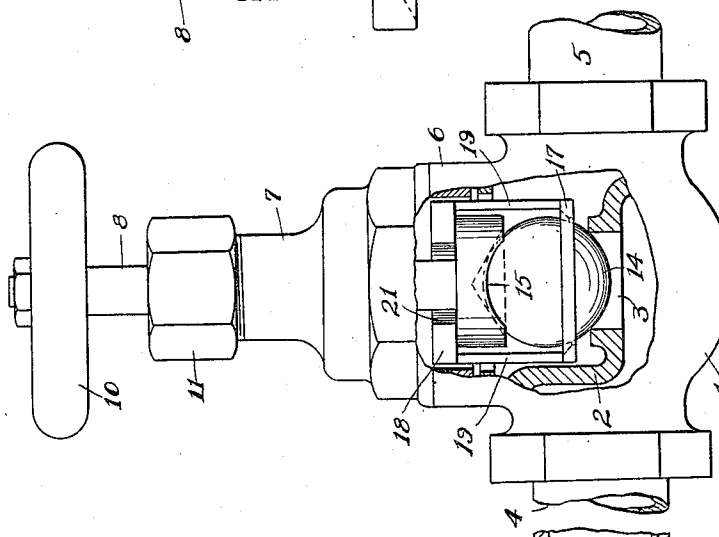


Fig. 1.

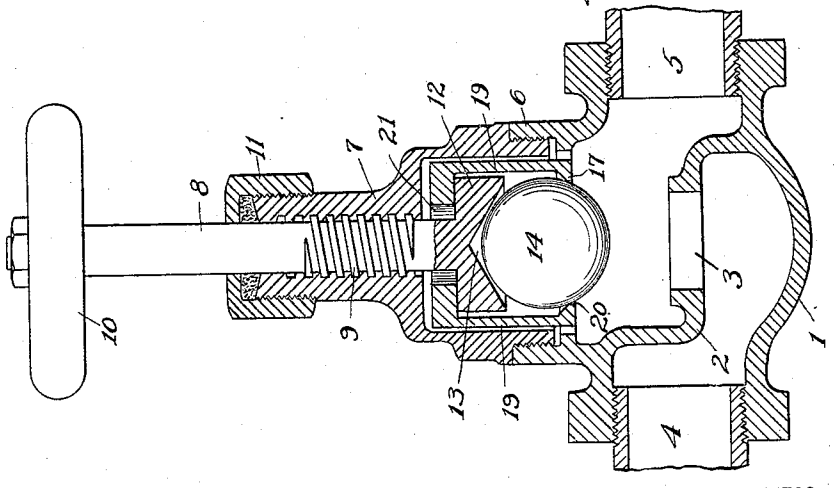


Fig. 2.

WITNESSES:

L. S. Woodhull

M. E. Broesamle

INVENTOR

Russell A. Milne.

BY

B. P. Thurber

ATTORNEY

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RUSSELL A. MILNE, OF DETROIT, MICHIGAN, ASSIGNOR TO PICARD-MILNE COMPANY, A COPARTNERSHIP COMPRISING ALBERT C. PICARD AND RUSSELL A. MILNE, BOTH OF DETROIT, MICHIGAN.

VALVE.

1,173,728. Specification of Letters Patent. Patented Feb. 29, 1916.

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To all whom it may concern:

Be it known that I, RUSSELL A. MILNE, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Valves; and I do 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, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to valves of the ball type, and consists in the construction and arrangement of parts hereinafter set forth and claimed.

The invention has for its object the provision of a simple and efficient valve construction in which the arrangement is such as to insure a more perfect seating of the valve through the provision of means for carrying the ball of the valve so as to allow it to freely turn as the valve is operated and successively present a new seating surface and overcome the liability of leakage through wear of the valve seat and ball.

A further object is the provision of a detachable cage for carrying the ball in such manner as to render the ready assembling as well as the disengagement for replacement of the wearing parts of the valve.

The preferred form of embodiment of the novel features of the present invention by which the above objects are attained is illustrated in the accompanying drawings, in which,

Figure 1 is a side elevation of the valve with its pipe connections, having a portion of the wall of the body of the valve broken away to show the interior arrangement of the parts embodying my invention, the valve being shown in its closed position. Fig. 2 is a central vertical sectional view through the valve, showing the parts in the opened position, the ball and valve stem being shown in elevation. Fig. 3 is a side elevation of the valve stem and cage for carrying the ball, showing the valve stem disengaged therefrom and indicating by dotted lines the position of the valve stem when engaged with the cage and its ball. Fig. 4 is a plan view of the valve cage.

Referring to the parts of the device by the characters of reference marked on the several views of the drawings, 1 represents a valve case of the ordinary globe valve type, having the usual dividing partition 2 through an opening 3 in which the induct and educt chambers of the valve communicate, and with which chambers the circulating pipes 4 and 5, respectively, are connected. Secured within the boss 6 of the valve case by screw-threaded engagement is the bonnet 7 through which the valve stem 8 passes, and which has screw-threaded engagement as at 9 with said bonnet, by which it is moved vertically to raise and lower the valve through the rotation of the handle 10 on the upper end thereof. The usual stuffing-box 11 embracing said stem has screw-threaded engagement with the upper end of the bonnet for effecting a close working fit about the stem. All of the above features are common in valve construction.

The lower end of the valve stem 8 is provided with an enlarged annular head 12, in the under face of which is an axial concavity 13, in which the ball 14, forming the plug or closure for the valve opening 3, is adapted to seat, and extending radially from said concavity to the periphery of said head, upon one side thereof, is a circular depression 15 which is slightly less in depth than the depth of the concavity 13, and which corresponds in its arc with the contour of the ball, as clearly shown in Figs. 1 and 2. The ball is held suspended in the concavity 13 in axial alinement with the valve stem by means of a cage 16. This cage comprises a lower ring 17 joined upon opposite sides in concentric spaced relation with opposite sides of an upper semi-circular plate 18 by means of parallel connecting arms 19. The lower ring 17 is formed with a central aperture 20 which is slightly less in diameter than the diameter of the ball, and which is beveled at its upper inner edge to receive and engage said ball on a line below its center, allowing the ball to extend below the lower face of said ring but preventing its passage therethrough. The upper or semi-circular plate 18 is formed with a central U-shaped aperture 21, the mouth of which opens through the plane of the chord of the arc of said plate. The sides of the aperture lie astride the stem 8 of the valve with the under face of the body of the plate engaging the upper face of the head

12 of said stem. The cage is thus supported loosely, forming a swivel connection with the head of the valve stem, and carries the ball therein loosely retained between the concavity of said head and the lower ring of the valve cage, wherein it is free to revolve and by which it is moved toward and from the opening 3 of the valve case, in which it is adapted to seat and close said opening, as shown in Fig. 1.

The ball is passed into the cage between the upper forward edge of the lower ring 17 and the face forming the chord of the semi-circular plate 18. The cage may then be assembled upon the valve stem by placing the radial depression 15 of said stem into registering alinement with the upper arc of the ball and by then passing said stem laterally into the U-shaped aperture of the semi-circular plate with the head of the valve stem entering the cage and engaging its upper face with the under face of said plate, as indicated by the dotted position illustrated in Fig. 3. The cage thus assembled upon the valve stem, when placed in the valve case in position within the bonnet of the valve, as shown in Figs. 1 and 2, will be held from disengagement with the valve stem through lateral movement by contact with the wall of the valve bonnet, which is sufficiently larger in diameter than the diameter of the valve cage to permit of the free movement of the cage therein as it raises and lowers the ball to open and close the passage of the valve through the vertical movement of the valve stem.

When the valve is closed through the rotation of the stem, the ball is crowded into and seats over the opening of the valve by the engagement of the concaved end of the valve stem with the upper arc of the ball; as shown in Fig. 1, thereby effecting a tight closure of the opening in the valve-chamber through the seating of the lower arc of the ball therein. When the valve is opened by a reverse rotation of the stem, the ball will be raised from its seat in the valve chamber and will hang freely suspended upon the head of the valve stem, as shown in Fig. 2.

This arrangement permits of the free movement of the connected parts and allows the ball to rotate so as to change the seating surface presented to the valve with each movement of the valve stem, and thus equalizing the wear upon the surface of the ball and at all times effecting a more nearly perfect closure with the seat than is ordinarily afforded.

I claim:

A ball-valve comprising a case having a valve seat therein, a valve stem movable toward and from said seat and having an enlarged head thereon, in the under face of which is formed an axial concavity and a radial depression, a ball for coöperating with said head and seat, a cage having a ring for carrying said ball therein, and having a U-shaped aperture for detachably receiving said valve stem above said head to loosely support said cage thereon, said head being adapted to pass over said ball through said radial depression and to receive said ball in said axial concavity.

In testimony whereof, I sign this specification.

RUSSELL A. MILNE.

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