

C. M. HEETER.
VALVE FOR DEEP WELLS.
APPLICATION FILED SEPT. 29, 1916.

1,351,906.

Patented Sept. 7, 1920.

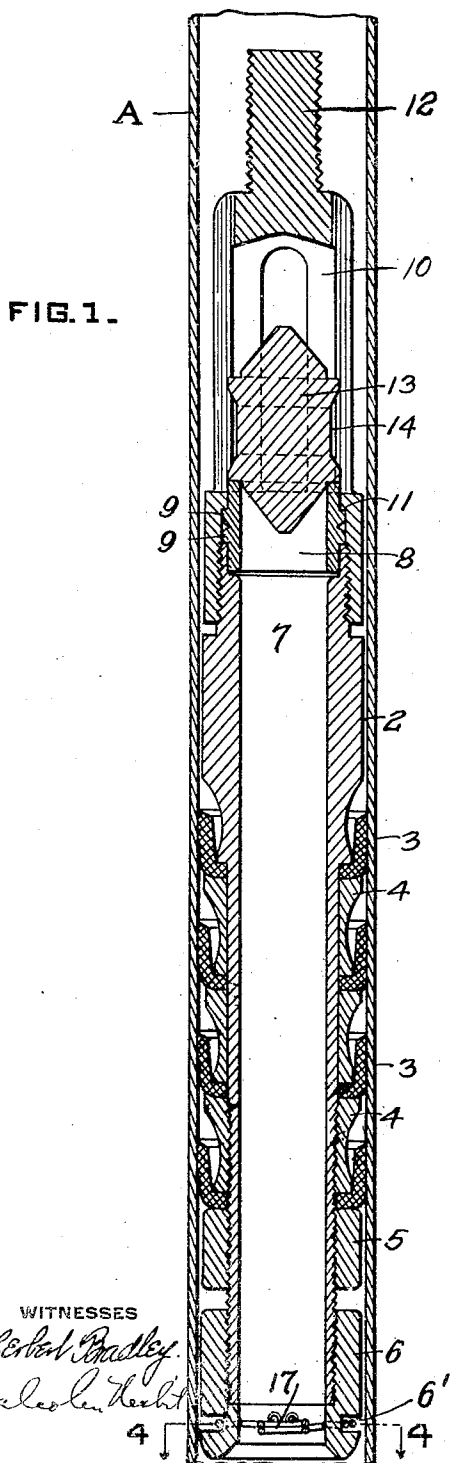


FIG. 2.

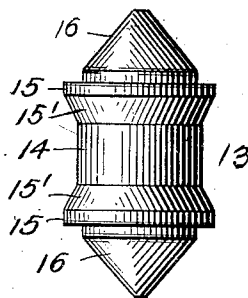


FIG. 3.

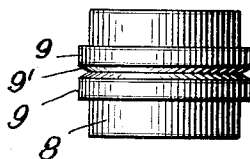
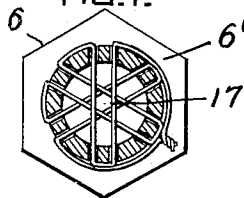


FIG. 4.



WITNESSES

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VALVE FOR DEEP WELLS.

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To all whom it may concern:

Be it known that I, CHARLES M. HEETER, a citizen of the United States, and a resident of Butler, in the county of Butler and the State of Pennsylvania, have invented certain new and useful Improvements in Valves for Deep Wells, of which the following is a specification.

This invention relates to valves for deep wells, the novel features thereof being applicable to both traveling and standing valves. One object is to provide a removable seat, having its bore the same diameter as the valve body bore, the seat being provided at its exterior with means for facilitating its removal. Heretofore, it has been usual to form the seat of smaller diameter than the body to afford access through the body bore for dislodging it. The contraction of the bore is undesirable as it reduces the capacity of the valve.

A further object of the invention is to provide a valve of improved construction which is movably held in a valve confining cage, and at the same time is of such form as to prevent it from sticking or binding, its shape being such as to preclude the accumulation thereon of sand or drillings which would tend to interfere with its free movement. Also the extremity of the valve which coöperates with the seat is of novel construction, and in the preferred practice the valve is of the same construction at both ends and is readily reversible.

Still a further purpose of the invention is to provide improved means at the lower extremity of the valve for adjustably confining the packing cups, and for preventing the confining means from becoming accidentally disconnected. The invention also includes means located at the valve inlet for excluding valve obstructing matter.

In the accompanying drawings, Figure 1 is a sectional elevation of valve mechanism embodying the several features of the invention. Fig. 2 is an elevation of the valve, and Fig. 3 is a similar view of the valve seat. Fig. 4 is a cross section of the screen carrying bottom portion of the valve body, taken on line 4—4 of Fig. 1.

Referring to the drawings, 2 designates the tubular body of a valve mechanism that may comprise either a traveling valve or a standing valve operative in well tubing A, and 3 are packing cups which embrace the

body, adjacent cups being separated by the sleeve-like spacers 4. The lower portion of the body is threaded externally and the cups and sleeves are confined on the body by nut 5. At the lower end of the body is the nut-like extremity piece 6, which is threaded internally to connect with the body. Part 6 protects the lower end of tubular body 2, and also serves to retain nut 5 and the packing cups and spacing sleeves even though the nut may become loose. Heretofore, the cup confining nut has at times loosened and dropped off, releasing the cups and spacers within the well and obstructing the latter as well as rendering the valve useless.

The upper end of the body bore 7 is enlarged at 7' and adapted to fit the enlargement is either end of the tubular reversible seat 8. The internal diameter of the seat corresponds with the internal diameter of body 2, and hence there is no contraction of the fluid passage through the valve body. At the exterior of the seat 8 is annular flange 9 which is adapted to rest on the extremity of body 2, with the seat projecting above the latter as shown. This flange is grooved horizontally at 9' to receive the edge of a cold chisel or other seat-loosening implement, whereby the seat may be readily dislodged. Heretofore, it has been customary to form the seat of smaller diameter than the body bore, and to remove it by means of a tool entered in the body. With the improved construction the seat may be readily dislodged from the exterior thereof.

A vertically slotted cage 10 comprises an upward continuation of body 2, the lower end of the cage being threaded internally to connect with the upper end of the body, and having the internal shoulder 11 adapted to engage seat flange 9 for confining the seat in place. Projecting from cage 10 is stem 12, which in the case of a traveling valve, may connect with the sucker rods, and for a standing valve may serve as a connecting device for the means utilized for inserting and removing the valve.

Operative within the cage 10 is the valve body 13 of spool form which is belted or contracted at 14 between its head-like flanges 15, contraction 14 and flanges 15 being connected by the sloping surfaces 15'. This construction provides for accurately guiding the reciprocating valve within cage 10, and its contracted exterior formation is such as to

offer no lodgment for sand or drillings, and hence the valve is prevented from sticking. The extremity of the valve which coöperates with seat 8 is preferably cone-shaped, as indicated at 16. This cone extremity extends into the seat, and head 15 rests on the latter as shown in Fig. 1. The cone extremity serves to accurately center the valve on its seat, and also to uniformly distribute the column of liquid around the valve. The valve is preferably of the double or reversible construction shown, and may be readily reversed by removing cage 10.

A screen 17 is provided at the valve inlet which prevents worn-off fragments of cups 3 and other solid matter from passing upward with the fluid and obstructing the valve. The screen consists preferably of crossed wires which are laced through openings in groove 6' in extremity piece 6, whereby the wire is confined entirely within the external lines of the valve. This form of screen does not appreciably obstruct the inflow of fluid and hence does not retard the operation of the valve.

As heretofore noted, the several improved features are applicable to either traveling or

standing valves, the resulting advantages being the same in either case.

I claim:

1. The combination of a tubular piston body provided at one end with a seat, a vertically slotted valve confining cage extending from the seat-carrying end of the body, and a valve within the cage adapted to co-operate with the seat, the valve having a spool shaped body with conically shaped ends.

2. The combination of a tubular piston body having a seat at one end, a vertically slotted cage comprising an extension of the seat-carrying end of the body, a valve movably confined in the cage and having a spool-shaped body whereby it is held in position and prevented from sticking, the valve being reversible and having cone shaped extremities with either extremity adapted to coöperate with the seat.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES M. HEETER.

Witnesses:

A. J. GUMPPER,
FRANK J. COLBERT.