

April 8, 1930.

T. QUINN ET AL

1,753,276

VALVE FOR WELLS

Filed June 15, 1927

2 Sheets-Sheet 1

Fig. 1.

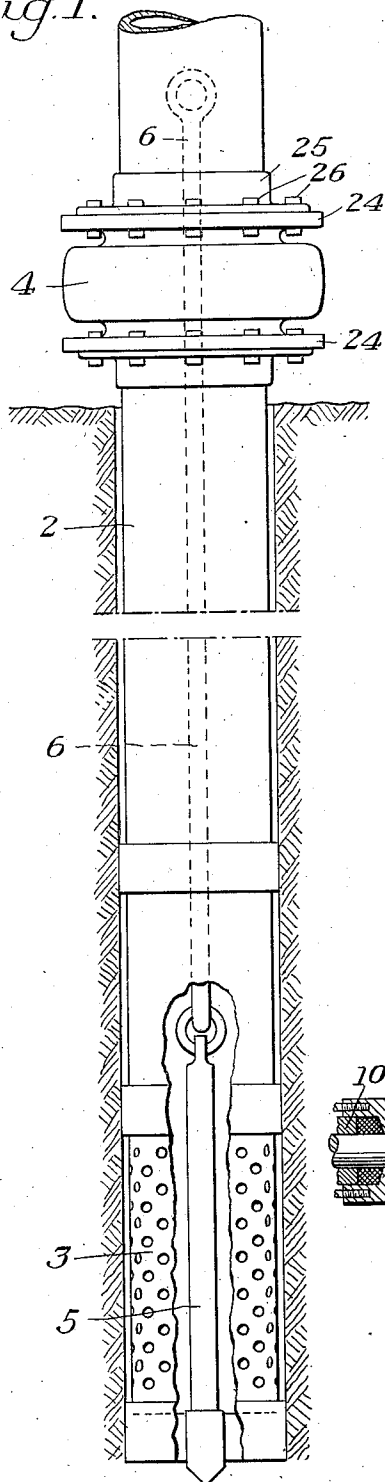


Fig. 5.

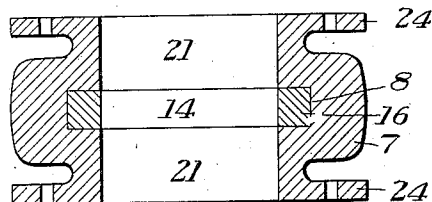


Fig. 7.

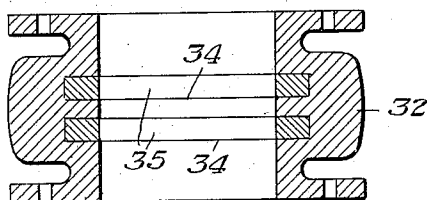


Fig. 6.

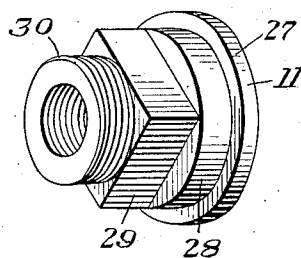
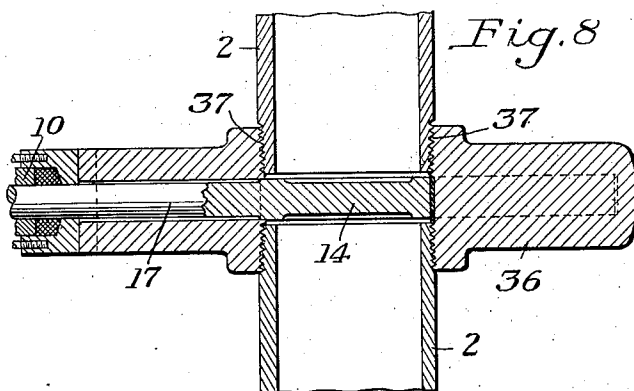


Fig. 8.



INVENTOR
Thomas Quinn
John F. Pites
By Byrnes, Steffens & Parnes
their attorneys.

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2 Sheets-Sheet 2

Fig. 2.

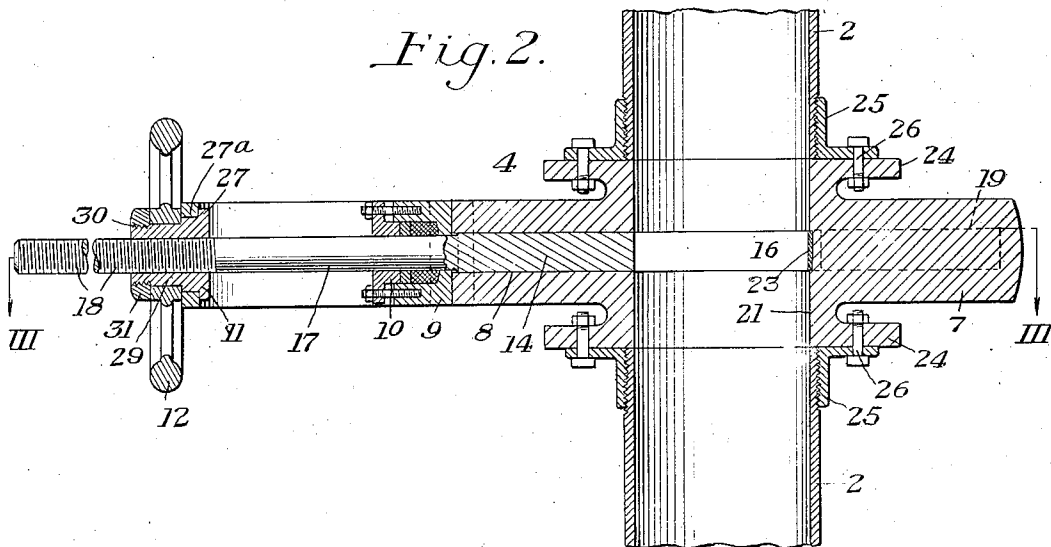


Fig. 3.

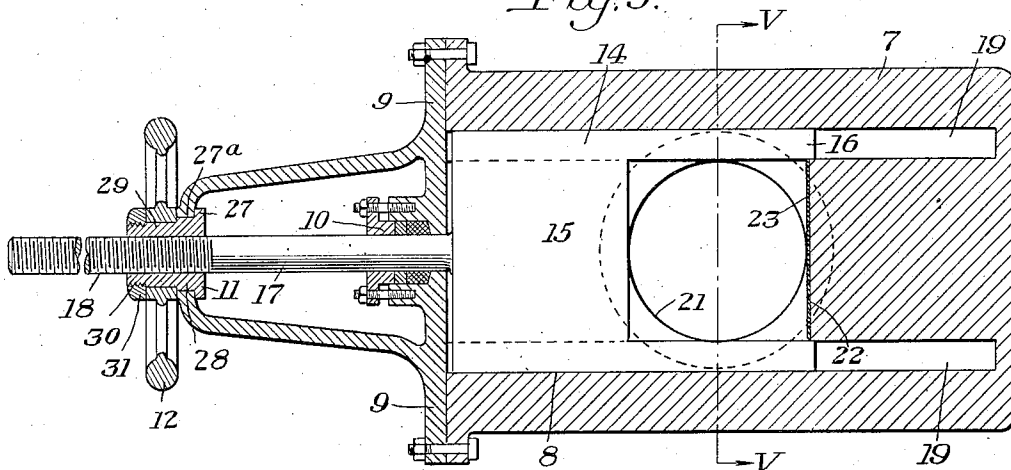
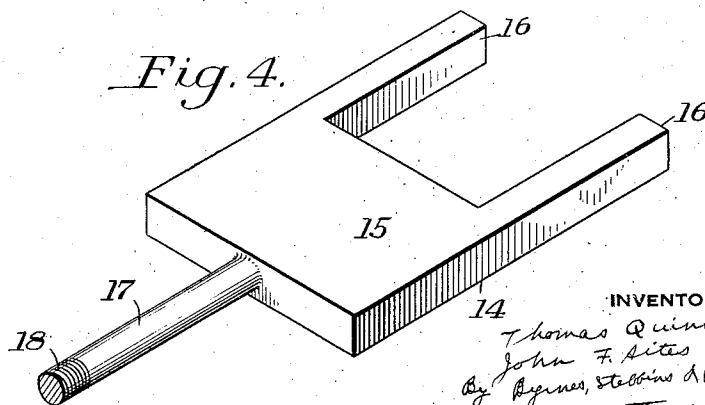


Fig. 4.



INVENTORS

Thomas Quinn
John F. Sites
By Rogers, Stephens & Parmelee
Their attorneys.

UNITED STATES PATENT OFFICE

THOMAS QUINN AND JOHN F. AITES, OF RIMERSBURG, PENNSYLVANIA

VALVE FOR WELLS

Application filed June 15, 1927. Serial No. 198,910.

Our invention relates to the drilling art and particularly to valves for shutting off a flow of fluid from a well casing during the drilling operation. In the drilling of wells considerable trouble and loss of valuable fluid is experienced by the formation of "gushers." Gushers are formed by the sudden piercing of a fluid bearing stratum of earth in which fluid is under such tremendous pressure that it escapes through the well casing with a high velocity and great difficulty is experienced in controlling the escaping fluid. Gushers are particularly troublesome if the fluid is of an inflammable nature such as natural gas or oil as the fluid may become ignited and burn for considerable periods of time.

In drilling wells it is possible to predetermine with a considerable degree of accuracy the depth at which the liquid bearing stratum or strata will be reached. Accordingly, we have provided a valve structure that may be inserted on the well casing when the latter is of a depth approaching the supposed depth of the liquid bearing stratum. Our valve is so constructed that it does not interfere with the drilling operation after it is placed on the casing. Should a stratum of fluid under high pressure be pierced by the drill, the drill will be withdrawn by the drillers or blown out of the casing by the escaping fluid according to the pressure thereof, after which our valve may be manipulated to close the casing and shut off the escape of the fluid without undue waste.

Furthermore, in the valves of the prior art, it has been possible for a deposit of sediment to accumulate in the valve seat so that when the gate is moved to its closed position, it is imperfectly seated and considerable leakage takes place. The details of the construction of our shut-off valve are such that it is impossible for accumulations of sediment to form in the valve seat when the valve is open. In the accompanying drawings which illustrate the present preferred embodiment of our invention,—

Figure 1 is a view, partially in elevation and partially in section, of a well casing embodying our invention;

Figure 2 is a sectional view of a well casing and valve embodying our invention;

Figure 3 is a sectional view taken along the section line III—III of Figure 2;

Figure 4 is a perspective view of the valve gate;

Figure 5 is a sectional view of the valve taken along the section line V—V of Figure 3;

Figure 6 is a perspective view of a detail of the invention;

Figure 7 is a view, similar to Figure 5, of a modified form of our invention; and

Figure 8 is a view, partially in section and partially in elevation, of a valve in closed position and a modified connection between the well casing and the valve.

Figure 1 illustrates a well casing 2 and screen 3 to which is attached a valve 4 embodying our invention and through which a drill 5 is actuated by a hoisting device 6, represented diagrammatically as a pull rod. During the drilling operation, the valve 4 is not placed in the casing until the length of the casing and screen approaches the calculated depth of the liquid bearing stratum the screen is expected to be imbedded in.

Referring to Figure 2 to 5, inclusive, the valve 4 comprises a frame 7 provided with a valve seat 8 opening at one end of the frame and closed by a cap 9 provided with a packing gland 10 and a collar 11 for the reception of a hand wheel 12. Referring to Figure 4, a valve gate 14 having a body portion 15, outwardly projecting arms 16 and a stem 17, the outer end of which is threaded at 18, fits in the seat 8 and makes a tight fit therewith. The arms 16 extend into pockets 19 formed in the frame 7. The ends of the projections 16 always close the openings of the pockets 19 to prevent the accumulation of mud or sand therein.

A cylindrical opening 21 extends through the frame 7 and is closed by the body portion 15 of the gate 14 when the latter is in its projected position. When the gate is in the open position, the forward edge of the body portion 15 and the inner edges of the projection 16 are substantially tangent to the inner surface of the opening. An edge 22 of the frame 7 is provided with packing material 23 to in-

sure a liquid tight seal when the gate 14 is in its closed position.

The frame 7 is provided with outstanding flanges 24 to which threaded flanges 25 are secured by bolts 26. The threaded flanges 25 engage the casing 2 for securing the valve in place. In assembling the valve, lower flange 22 is threaded onto the casing 2. The frame 7 is then bolted into position with the upper flange 25 in place. The casing 2 is then threaded into the upper flange 25. The flange 25 may also be threaded onto the casing 2 and then bolted to the frame 7.

The threads 18 on the stem 17 engage internal threads on the collar 11. Referring to Figure 6, the collar 11 is provided with a flange 27 engaging an internal seat 27^a on the cap 9 and cylindrical portion 28 of the collar turns in the cap 9. Beyond the cylindrical portion 28 the collar 11 is provided with a portion 29 of rectangular cross section to engage a squared opening in the hub of the hand wheel 12. Beyond the portion 29 the collar 11 is provided with a threaded portion 30 on which a clamp nut 31 is threaded for securing the hand wheel 12 in place. Accordingly, the rotation of the hand wheel 12 is transmitted through the collar 11 to the stem 18 and the latter is given a reciprocal movement in accordance with the direction of movement of the hand wheel.

Referring to Figure 7, we have shown a cross sectional view of a frame 32 provided with a pair of seats 34 for the reception of a pair of gates 35. This form of our invention is particularly adapted for use in wells subjected to high pressures. The frictional engagement between the edges of the seats 34 and the projections 35 is reduced by providing a plurality of gates to withstand the pressure rather than by providing a single gate of sufficient strength to withstand the same pressure.

Referring to Figure 8, we have shown a frame 36 provided with internal threads 37 for directly engaging the threads on the casings 2. This form of our invention is particularly adapted for wells of small diameter. The smaller size of the valve makes it possible to thread it directly onto the casings, rather than to thread it on a flange.

We have provided a valve for closing off well casings during the drilling operation when the drill pierces a fluid bearing stratum under high pressure. Our shut-off valve is inserted in the well casing and permits operation and withdrawal of the drill. At the same time, the valve is constructed to prevent the accumulation of particles of foreign matter, such as sand, in the valve seat which might interfere with the closing of the valve under high pressure. We have also provided a double form of valve that may be used in connection with wells where an extremely high pressure is to be expected.

While we have shown and described our valve in connection with well casings, it is to be understood that its use is not necessarily limited to such applications as it may be used in sewers, water and gas lines, and the like, in which there is a possibility of the accumulation of sediment in the valve structure, to prevent leakage when the valve is closed. For certain purposes the projecting legs may be omitted.

It is to be understood that various other changes may be made in the invention without departing from the scope of the appended claims.

We claim:

1. A valve structure comprising a valve gate having a guiding projection thereon, substantially an entire outer edge of the gate and projection lying in the same plane, said structure having a chamber therein for the reception of the valve gate, and a pocket formed in a wall of the chamber and extending in the direction of movement of the valve gate, said projection sealing the pocket against the admission of dirt when the valve gate is in its open position.
2. A valve structure comprising a valve gate having parallel guiding projections thereon, the outer edges of said projections and gate lying in substantially the same planes, said structure having a chamber therein for the reception of the valve gate, and parallel pockets formed in the wall of the chamber against which the valve gate bears when in its closed position, said guiding projections being movable longitudinally of the pockets during movement of the valve gate and sealing the pockets against the admission of dirt when the gate is in its open position.

In testimony whereof we have hereunto set our hands.

THOMAS QUINN.
JOHN F. AITES.