B. R. PILCHER.

PNEUMATIC WATER ELEVATOR.

APPLICATION FILED AUG. 20, 1910.

1,003,945. **Patented Sept. 19, 1911.**

2 SHEETS—SHEET 1.

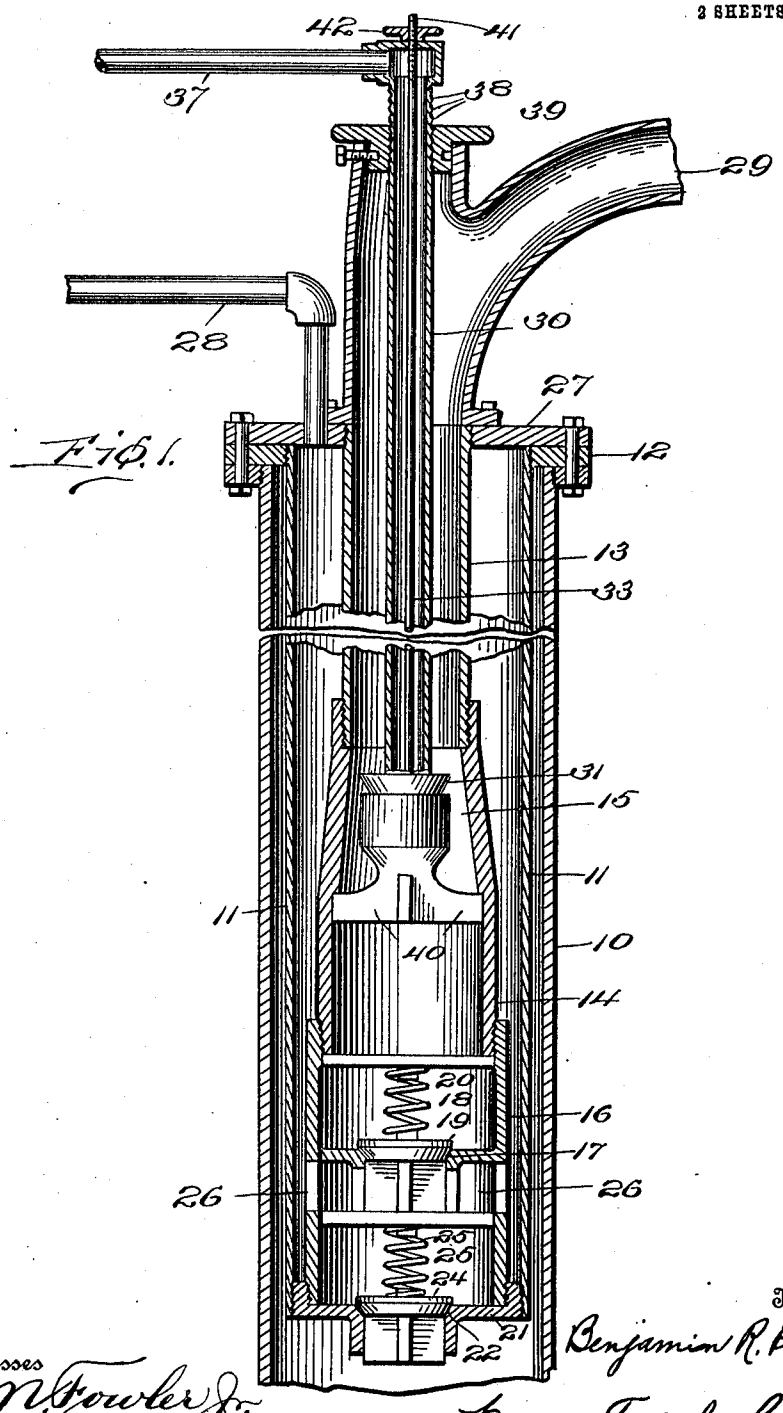

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

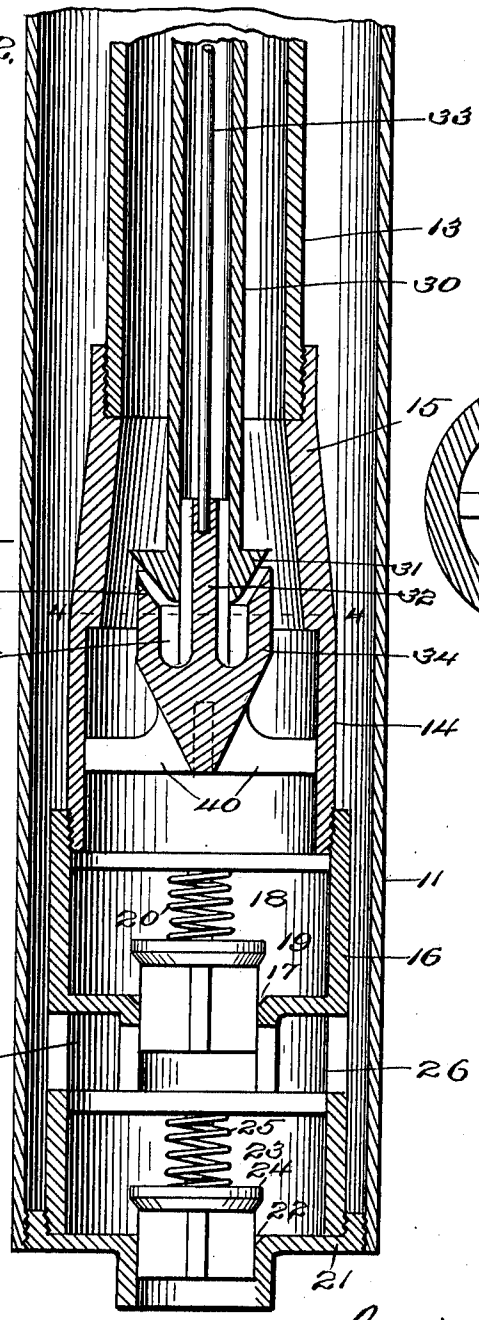


Fig. 3.

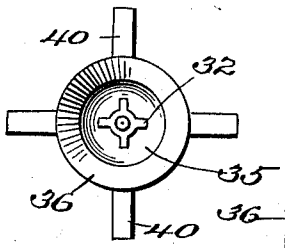
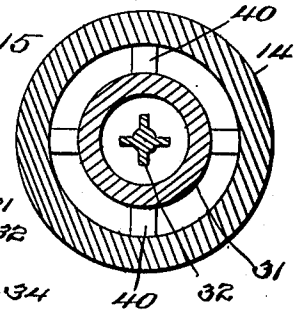


Fig. 4.



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UNITED STATES PATENT OFFICE.

BENJAMIN R. PILCHER, OF DOTHAN, ALABAMA.

PNEUMATIC WATER-ELEVATOR.

1,003,945. Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed August 20, 1910. Serial No. 578,154.

To all whom it may concern:

Be it known that I, BENJAMIN R. PILCHER, a citizen of the United States, residing at Dothan, in the county of Houston and State of Alabama, have invented certain new and useful Improvements in Pneumatic Water-Elevators; and I do hereby 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.

This invention relates to pneumatic water elevators and has for an object to provide a device adapted to be inserted into a well casing with improved means for employing impressed air for raising water from such well.

A further object of the invention is to employ impressed air in form of a fluid piston in one instance with an injector principle employed to assist such fluid piston.

A further object of the invention is to provide improved valves and valve seats for use in the device of the class.

With these and other objects in view, the invention comprises certain novel constructions, combinations and arrangements of parts as will be hereinafter more fully described and claimed.

In the drawings: Figure 1 is a vertical diametrical sectional view of a well casing and the water elevator tubes and pipes showing the valves in side elevation. Fig. 2 is a vertical diametrical sectional view in enlarged detail through the lifting valve. Fig. 3 is a top plan view of the lifting valve seat and its positioning spider. Fig. 4 is a sectional view of the lift valve taken on line 4—4 of Fig. 2.

Like characters of reference designate corresponding parts throughout the several views.

A pipe or casing 10 is provided which is the usual and ordinary casing employed in deep wells and into this casing 10 is inserted an inner casing 11 supported at the top by means of a head or flange 12. Inserted also within the inner casing 11 is a pipe 13 intended to extend for a considerable distance below the normal water line and provided at its lower end with a housing 14 bored cylindrically at its lower end and conical or tapered at its upper end as indicated at 15. At the lower end the housing 14 is provided with a pipe section 16 secured thereon producing a valve seat 17 and valve chamber 18 accommodating a valve 19 held normally yielding at the seat by the spring 20. At its lower end the tube section 16 is provided with a head 21 forming a valve seat 22 and valve chamber 23 to accommodate a valve 24 held yieldingly to seat by the spring 25. Both the valves 19 and 24 open yieldingly upwardly to prevent the passage of water downwardly therethrough. The head 21 is also connected with the lower end of the inner casing 11 whereby an annular space or chamber is provided about the exterior of the tube section 16, such section being provided with openings 26 to permit the passage of fluid from the annular space into the valve chamber 23, and by moving the valve 19 from seat to pass upwardly into the valve chamber 18.

At its upper end the inner casing 11 is closed by a head 27 and an air pipe 28 leads through such head into the interior of the inner casing 11. With the water level then normally standing at a considerable distance above the openings 26 the pressure of such water will cause the water to stand at approximately the same level within the tube 13 by raising the valve 19. If now, air or other fluid under pressure is admitted through the pipe 28 it will force the water downwardly within the inner casing 11 and upwardly within the pipe 13. The pressure of air is stopped before all of the water in the casing 11 has been forced into the tube 13 and the pressure relieved whereupon the weight of the column of water within the tube 13 will close the valve 19 and prevent its return, while the pressure of the water within the casing 10 will open the valve 24 and permit water to enter the valve chamber 23 and upwardly into the inner casing 11. The intermittent introduction of air under pressure through the pipe 28 will serve as a fluid piston to raise water within the pipe 13 and eject it through the discharge pipe 29.

To assist in raising the water within the pipe 13 a pipe 30 is extended downwardly within and concentric with the pipe 13 and is provided at its lower end with a conical valve 31, such valve being hollow and embracing a spider 32 which in turn is connected with a rod 33 extending outwardly within and concentric with the pipe 30. The spider 32 carries the valve seat member 34 which is provided with an annular chamber 35 communicating with the pipe 30 through

the openings in the spider 32. The valve seat member 34 is provided with a conical seat 36 proportioned and positioned to receive the valve 31, the valve and seat being so combined that the interval or space between such valve and seat is defined by walls extending upwardly at an inclination directing such opening toward the conical housing 15. With air admitted through the pipe 37 to the pipe 30 it is apparent that it will be ejected through the space between the valve 31 and the seat 36 and being directed upwardly against the inclined walls 15 will carry with it the column of water within the pipe 13 above such valve. To provide for the adjustment of the valve 31 relative to the seat 36 the pipe 30 is provided with through threads 38 at its upper end and a hand wheel 39 is mounted as a nut upon such threads and to rotate upon the upper end of the pipe 13. By rotating the hand wheel 39 it is apparent that the valve 31 will be raised or lowered relative to the valve seat 36 and the orifice between such valve and its seat thereby increased or decreased. The occasion for increasing or decreasing such orifice is to provide fluid under pressure enough and only enough to raise the volume of water which will pass between the upper edge of the valve 31 and the inclined walls 15, and the amount of water raised is controlled by the amplitude of the annular space so defined.

To provide for controlling the amount of water delivered it is found desirable to move the valve and its seat relative to the inclined walls 15 to thereby increase or decrease such annular space and to consequently increase or diminish the amount of water delivered. To make such adjustment the valve seat member 34 is provided with spider arms 40 bearing against and vertically slidable within the cylindrical portion of the housing 14 and the rod 33 which is connected rigidly with such valve seat, member 34 is provided at its upper end with a screw threaded portion 41 engaged by hand wheel 42 bearing upon the upper end of the pipe 30 by the manipulation of which the valve seat member 44 may be raised and lowered to increase or decrease the space between the valve and the inclined walls, the members being shown in raised position at Fig. 1, and in partially lowered position at Fig. 2, in the latter position increasing the space between the valve and the valve housing.

The air admitted through the pipe 37 and its communicating pipe 30 may be continuous whereby a continuous and steady flow of water is lifted through the pipe 13 and discharged through the nozzle 29, but the air admitted through the pipe 28 which serves as the fluid piston must be intermittent either in its admission or its tension. With the siphon only employed, that is to say, with air admitted only through the pipe 37 the valves 19 and 24 are maintained constantly open by the pressure of the water in the casing 10, but with the intermittent fluid piston employed the valves are alternately opened and closed as before described.

While it is desirable to employ air from the same source through the pipes 28 and 37 and to operate both forms of lifting in conjunction it will be apparent that in case of accident or for any other reason, or when desired, either of said devices may be used independently of the other, or either one may be discontinued when the flow of water required is diminished.

The structure and mechanism whereby air from the pipe 28 is employed forms the subject matter of a co-pending application, Serial No. 578,542, filed Aug. 23, 1910, the present application being directed to the mechanism whereby air from the source 37 is employed and said co-pending application specifically claims the check valves and housing in conjunction with the well casings and discharge pipe whereby intermittently introduced air will lift the water and discharge the same through the pipe 29.

What I claim is:

1. In a pneumatic water elevator a housing having inclined sides, a discharge nozzle disposed within the housing and directed to discharge against the inclined sides, and means to move the nozzle to vary the space between the nozzle and the housing.

2. In a pneumatic water elevator a housing having inclined sides, a nozzle disposed within the housing and defining a passage between the nozzle and housing, such nozzle being proportioned to direct discharge against the inclined sides, and means to move the nozzle to vary the amplitude of the passage.

3. In a pneumatic water elevator, a housing having inclined sides, a valve located within the housing, a valve seat associated with the valve and in combination producing a discharge nozzle directed toward the inclined sides, and means to move the valve and seat independently.

4. In a pneumatic water elevator a housing having inclined sides, a valve seat member slidably disposed within the housing and adapted to move to vary the passage between the member and the inclined sides, and a valve associated with the valve seat and in combination producing a discharge nozzle directed toward the inclined sides of the housing.

5. In a pnuematic water elevator a housing having inclined sides, a valve seat member slidably disposed within the housing, a valve associated with the valve seat member and in combination producing a discharge

nozzle directed against the inclined sides, means to raise water above the valve seat member and means to prevent the backward flow of the water so raised.

6. In a pneumatic water elevator a valve housing, a valve seat member disposed within the housing and having upwardly inclined conical walls, a valve disposed within the valve seat member, and having complementary conical walls, a casing surrounding the housing, means to admit fluid under pressure to the casing to raise a column of water within the housing and valves arranged to prevent the backward flow of the column of water so raised.

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

BENJAMIN R. PILCHER.

Witnesses:
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NANNIE MEEM.