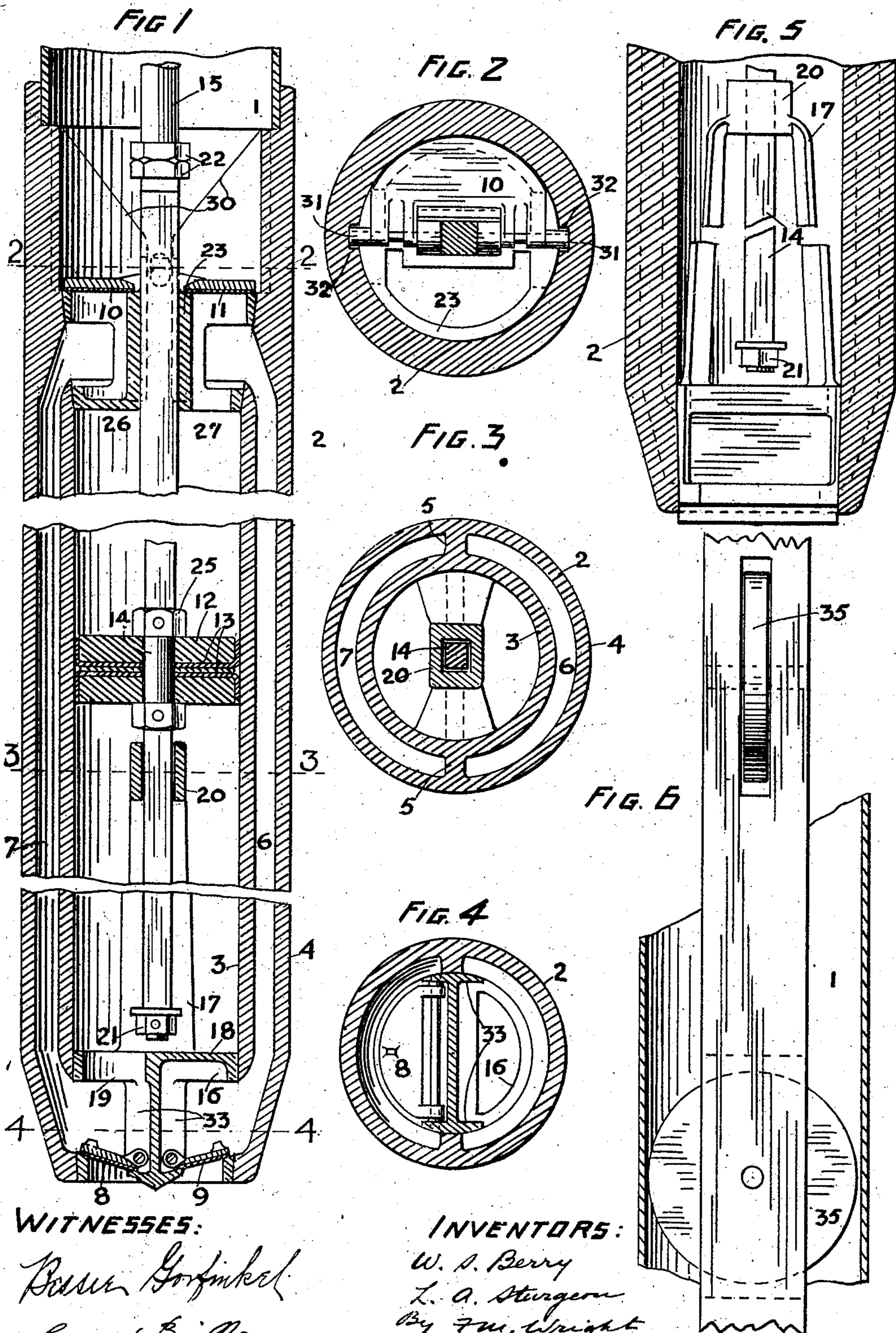


No. 816,064.

PATENTED MAR. 27, 1906.

W. S. BERRY & L. A. STURGEON.  
DOUBLE ACTING DEEP WELL PUMP.

APPLICATION FILED JUNE 12, 1905.



# UNITED STATES PATENT OFFICE.

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## DOUBLE-ACTING DEEP-WELL PUMP.

No. 816,064.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed June 12, 1905. Serial No. 264,786.

*To all whom it may concern:*

Be it known that we, WILLIAM S. BERRY and LEONARD A. STURGEON, citizens of the United States, residing at Lindsay, in the county of Tulare and State of California, have invented certain new and useful Improvements in Double-Acting Deep-Well Pumps, of which the following is a specification.

This invention relates to a double-acting deep-well pump, the object of the invention being to provide an apparatus of this character which will be more economical in operation than those heretofore provided.

In the accompanying drawings, Figure 1 is a broken vertical section of the pump-cylinder. Fig. 2 is a horizontal section on the line 2 2 of Fig. 1. Fig. 3 is a similar view on the line 3 3 of Fig. 1. Fig. 4 is a similar view on the line 4 4 of Fig. 1. Fig. 5 is a broken vertical section taken at right angles to Fig. 1 of the lower part of the pump-cylinder. Fig. 6 is a broken vertical section of the pipe-column with the pump-rod therein.

Referring to the drawings, 1 represents the pipe-column which carries the water to the surface of the ground, and 2 represents the pump-cylinder connected to said column. Said cylinder, except at the upper portion thereof, comprises an inner tube 3, an outer tube 4, and vertical webs 5, connecting said tubes, thus dividing the annular space between the tubes into two diametrically opposite suction-channels 6 7. At the lower end of the inner cylinder are the suction-valves 8 9 and at the upper end are the discharge-valves 10 11. The piston 12, fitted with cup-leathers 13, is actuated by the piston-rod 14, which is connected to the wooden pump-rods 15, running to the surface. The section-valves 8 9 are contained in a cage 16, which forms the lower portion of a yoke 17, the lower portion of which cage, carrying the valve-seats and valves, is tapered and fits into a corresponding taper of the cylinder proper. The upper portion of said cage is closed on one side, as shown at 18, and open on the other, as shown at 19. The yoke 17, formed integral with the cage, carries at the top a collar 20 through a square hole in which the piston-rod 14 slides, a nut 21 being securely fastened to the extreme lower end of the piston-rod. The collar is larger than the

rod, permitting the latter to move freely in the same; but it will not permit the nut to pass. The distance between the top of the cage 16 and the lower surface of the collar is greater than the stroke of the piston. If, now, the cage 16, with its valves, is seated with its lower tapering end in the corresponding taper of the cylinder proper, which can be effected by means of pressure exerted by the bottom of the rod 14 on the top of the cage, then the nut 21 at either end of its reciprocation will not strike stationary parts when the piston is properly adjusted centrally and is running its proper length of stroke. The piston-rod is square where it passes through the collar of the yoke, so as to prevent the yoke, with its valves, turning in relation to the piston-rod. It is round at the part carrying the piston and square above the piston up to the double nuts 22 over the upper valve-cage 23, whence it continues round to its connection with the wooden pump-rods 15. The upper valve-cage 23, carrying the valves 10 and 11, is made tapering, so as to be seated by pressure exerted on the piston-rod through the medium of the wooden rods from the surface. The two nuts 22 above the upper valve-cage 23 and the yoke 17, with the lower valves, sit in their respective tapering seats at the same time. On the other hand, the top nut 25 of the piston will raise the upper valve-cage 23 before the nut 21 raises the yoke 17, so that they will not need to be raised out of their tapering seats, at the same time requiring, therefore, only one-half the force which will be necessary to raise both at the same time. The upper valve-cage is closed at the bottom on one side, as shown at 26, and open at the bottom on the other side, as shown at 27, the closure 26 of the upper cage being on the same side as the opening 19 of the lower cage.

As both valve-chambers must in operation have a certain position relative to the annular passages between the two tubes, two wedges 30 at the top of the cylinder-castings are provided to guide two projections 31 of the upper valve-chamber into recesses 32 of the cylinder, so located as to hold this valve-chamber in its proper position. The proper location of the lower valve-chamber is insured by the proper position of the piston-rod. In order to prevent leakage from one of the upper valve-chambers to the other and

also from one of the lower valve-chambers to the other, the pressure in the two upper valve-chambers during the operation of pumping being different, as also the pressure in the two lower valve-chambers, ribs 33 are provided, which sit upon the taper of the cylinder.

The operation of the pump is as follows: When the piston 11 moves upward, the valve 9 opens, admitting water under the piston, the valve 11 being seated by the pressure of the discharge - column above it. At the same time the upward movement of the piston forces the water above it through the valve 10, the valve 8 being seated. On the contrary stroke the process is reversed, the valves 8 and 11 being open and the valves 9 and 10 being seated.

Being a double-acting pump, the piston-rod and the wooden rods are subjected alternately to subjection and tension. In order to prevent the wooden rods buckling under the stress of compression, sets of rollers 35 are provided at proper intervals, slightly smaller in diameter than the inside diameter of the pipe-column and placed so that the planes of the rollers at right angles to their axes are at right angles to each other.

We claim—

1. In an apparatus of the character described, the combination of a cylinder having inner and outer tubes, and longitudinal webs dividing the annular space between said tubes into independent suction - channels, a piston in the inner tube, only one of the channels communicating with the interior of the inner tube below the piston, and the other communicating only with the interior of the inner tube above the piston, a cage and a pair of valves carried thereby at the lower end of the cylinder, said valves admitting liquid into the respective channels, and a cage and a pair of valves carried thereby at the upper end of the cylinder discharging the liquid from the respective channels, and a piston-rod connected with said piston and also loosely connected to said cages whereby said

cages can be withdrawn with the withdrawal of the piston-rod, substantially as described.

2. In an apparatus of the character described, the combination of a cylinder having inner and outer tubes, and longitudinal webs dividing the annular space between said tubes into independent suction - channels, a piston in the inner tube, a cage in the lower end of the outer tube and having a pair of valves therein, said cage also forming a closure on one side of the lower end of the inner tube, but admitting access thereto on the other side, a cage at the upper portion of the outer tube and a pair of valves carried thereby, said cage also forming on one side a closure for the upper end of the inner tube, but admitting access to the inner tube on the other side, and a piston-rod loosely connected to said cages whereby they may be withdrawn with the withdrawal of the piston-rod, substantially as described.

3. In an apparatus of the character described, the combination of a cylinder having inner and outer tubes and webs dividing the annular space between said tubes longitudinally into independent channels, a cage in the lower end of the cylinder having two valves admitting the liquid and a closure preventing a passage of liquid from one of said valves to the interior of the inner tube below the piston while permitting the passage of liquid thereinto through the other valve, a cage at the upper end of the cylinder having two valves for permitting the passage of the liquid, and a closure preventing communication between the upper portion of the inner tube and one of said valves and allowing it with the other valve, and a piston working in said inner tube, substantially as described.

In witness whereof we have hereunto set our hands in the presence of two subscribing witnesses.

W. S. BERRY.  
L. A. STURGEON.

Witnesses:

FRANCIS M. WRIGHT,  
BESSIE GORFINKEL.