(No Model.) 2 Sheets—Sheet 1.

W. C. WOODWARD.

PUMP.

No. 589,458. Patented Sept. 7, 1897.

Fig. 1.

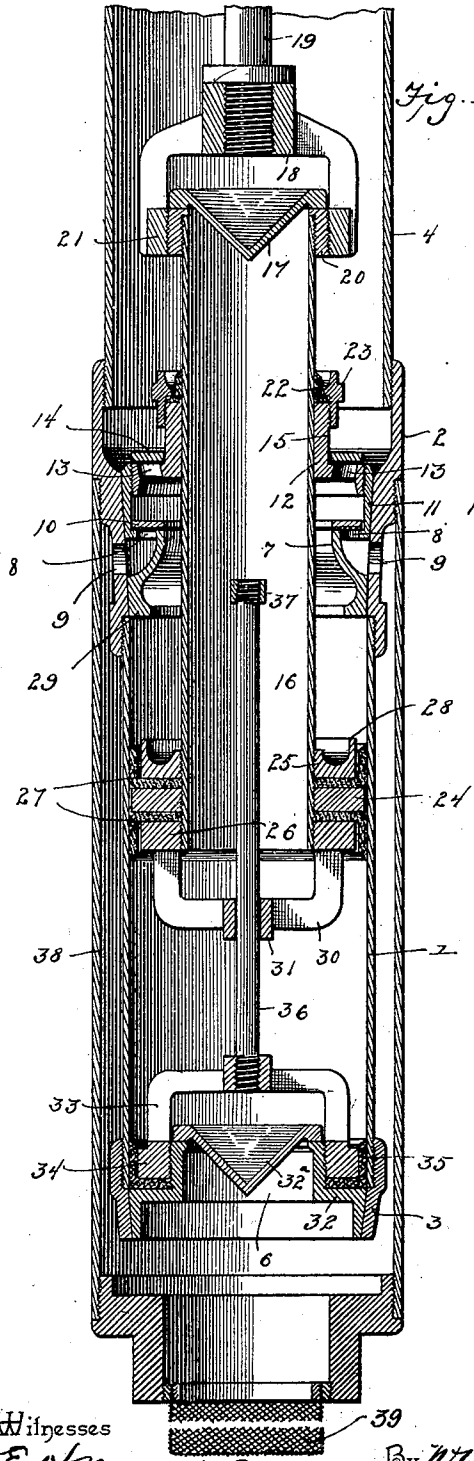
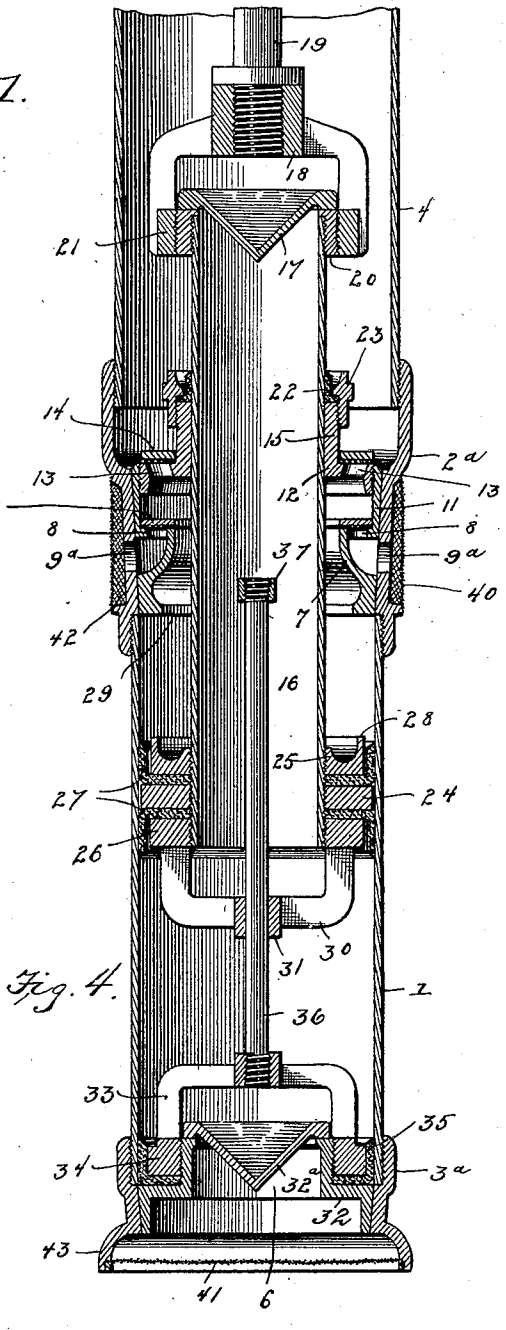


Fig. 4.



Witnesses
E. F. Mowrer
C. E. Hoyle

Inventor
William C. Woodward,

By his Attorneys,
C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. C. WOODWARD.

PUMP.

No. 589,458. Patented Sept. 7, 1897.

Fig. 2.

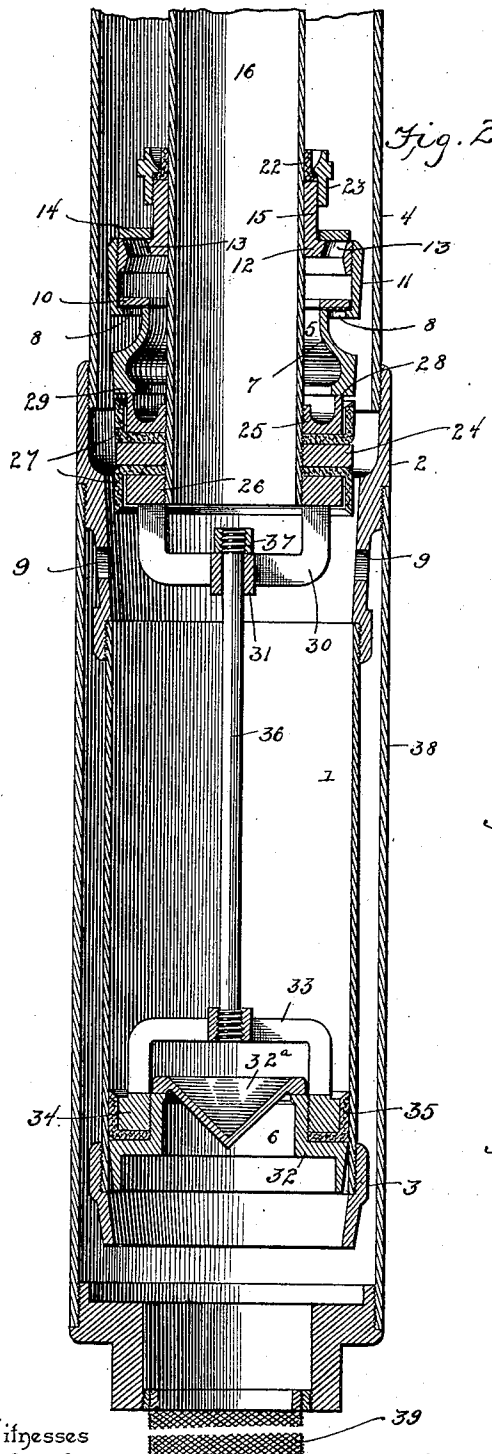
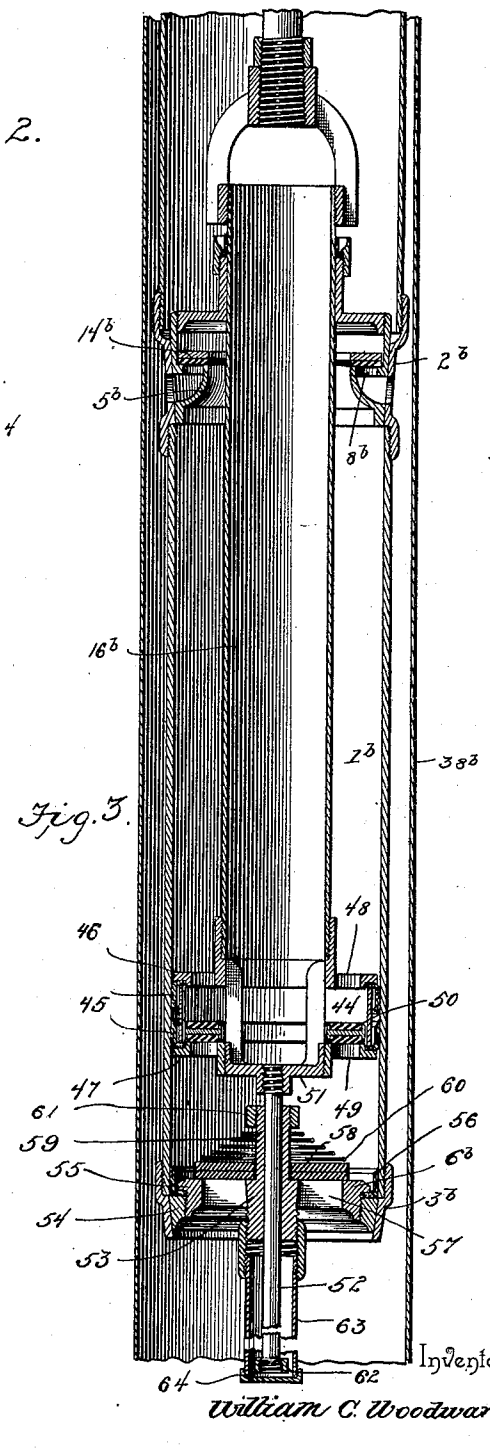


Fig. 3.



Witnesses
E. F. Monroe
C. E. Doyle

Inventor
William C. Woodward

By Wis Attorneys,
C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM C. WOODWARD, OF LOS ANGELES, CALIFORNIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 589,458, dated September 7, 1897.

Application filed July 7, 1896. Serial No. 598,334. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. WOODWARD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Pump, of which the following is a specification.

My invention relates to deep-well pumps; and the object in view is to provide a construction whereby the plunger, valve-seats, and coöperating parts may be withdrawn from the pump barrel or cylinder without disturbing the latter, to provide for cleaning and repairing.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a central sectional view of a pump constructed in accordance with my invention. Fig. 2 is a similar view showing the relative positions of the parts during the drawing of the plunger and valve-seats. Fig. 3 is a similar view of a slightly-modified form of pump. Fig. 4 is a similar view of another modified form of the apparatus wherein independent strainers are used for the upper and lower inlets.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a pump barrel or cylinder provided with upper and lower valve-seat rests 2 and 3, which consist of castings into which are threaded the contiguous extremities of the pump-barrel, the upper casting being also constructed to receive the lower extremity of the tubing 4. The inner or supporting surfaces of the rests are of downwardly-tapered or conical construction to receive upper and lower valve-seats 5 and 6, which are exteriorly constructed to fit these tapered or conical rests, whereby the valve-seats are upwardly displaceable.

The upper valve-seat 5 consists of a casting 7, fitted in the rest 2 and having a series of lateral ports 8, which register with lateral ports 9 in the rest when the valve-seat is fitted therein, and the ports 8 are adapted to be closed by means of an annular or ring valve 10, fitted in an interiorly-cylindrical portion 11 of the casting 7. Threaded in the upper end of the cylindrical portion 11 is a second casting 12, having ports 13, fitted with an annular or ring valve 14, which is mounted to slide vertically upon an exteriorly-cylindrical portion 15 of the casting 12. The valves 10 and 14 are upwardly opening and are preferably retained seated by gravity and the pressure of superjacent fluid.

The cylindrical portion 15 of the casting 12 forms a guide for a hollow plunger 16, having a tubular body portion which operates in said guide and is fitted at its upper end with an upwardly-opening valve 17, arranged in a cage 18, by which connection is made with the lower end of the plunger-rod 19. The plunger-valve 17 is preferably of inverted conical construction to deflect the vertically-moving column of liquid and avoid unnecessary obstruction, and the same is seated peripherally upon an annular seat 20, which is preferably threaded upon the upper extremity of the tubular body portion of the plunger. The cage is provided with a collar 21, which is threaded upon the valve-seat 20. A packing-strip 22 of flexible material is carried by the casting 12 in contact with the exterior surface of the plunger and is secured in place by means of a retaining-ring 23. The plunger-head consists of a disk 24, threaded upon the tubular body portion, and retaining rings or nuts 25 and 26, between which and the disk are arranged packing-rings 27, the upper ring being provided with a raised edge or flange 28 for engaging an abrupt shoulder or abutment 29 at the lower end of the cylinder valve-seat 5, as shown in Fig. 2. The lower ring 26 carries a spider 30, having a central guide 31 in coaxial alinement with the plunger.

The lower cylinder valve-seat consists of an annular casting which is exteriorly tapered or conical in construction and supports an inverted conical valve 32^a, similar in construction to the valve 17 and arranged in a cage 33. This cage is carried by a ring 34, which serves to secure the packing-strip 35 in place, said packing-ring being in contact with the interior surface of the pump-barrel to prevent leakage between the exterior surface of the valve-seat and the rest 3. A loose connection is employed between the lower cylinder valve-seat and the plunger by means of a lift-rod

36, which is supported by the cage 33 and operates in the guide 31, the same terminating at its upper end in an enlargement 37, which in the construction illustrated consists of a nut.

From the above description it will be seen that the upper and lower cylinder-ports are controlled, respectively, by inwardly-opening or inlet valves arranged upon seats which are removably fitted in the pump-barrel, and while the plunger is free to reciprocate independently of said valves and seats with its head between the planes thereof it is obvious that when the plunger is elevated sufficiently to cause contact of the rim or flange 28 with the shoulder 29 the upper valve-seat will be dismounted, and if the upward movement is continued sufficiently to bring the spider 30 in contact with the enlargement at the upper end of the lift-rod 36 the lower valve-seat will be dismounted.

In the construction illustrated in Figs. 1 and 2 the pump-barrel is inclosed by a cylindrical jacket 38, threaded interiorly upon the casting 2 at a point above the inlet-ports 9 and extending below the lower inlet-port, where it is fitted with a strainer 39, through which all of the liquid entering either of the inlet-ports passes, whereas in the construction illustrated in Fig. 4, while the pump mechanism is the same, the upper and lower inlet-ports are protected by independent strainers 40 and 41. The upper strainer 40 covers a cavity 42, communicating with inlet-ports 9^a in the casting 2^a, and is secured to the casting, and the lower strainer 41 is attached to a depending lip 43 on the casting 3^a, which forms the rest for the lower cylinder valve-seat. In other respects the construction illustrated in Fig. 4 is identical with that shown in Figs. 1 and 2.

In the construction illustrated in Fig. 3 the pump-barrel 1^b is fitted with upper and lower cylinder-valve-seat rests 2^b and 3^b to receive the valve-seats 5^b and 6^b. The seat 5^b is provided with inlet-ports 8^b, controlled by a valve 14^b. The hollow plunger 16^b is similar in construction to that above described, except that its open upper end is not valved, but is permanently open. The plunger-valve is arranged at the lower end of the tubular body portion, and all communication between the interior of the barrel and the tubing above the plane of the valve-seat 5 is through the plunger and is controlled by the plunger-valve. In the construction illustrated the plunger-head is hollow and consists of a band 44, carrying upper and lower packing-strips 45, which are held in place by upper and lower caps 46 and 47, threaded upon the tubular body portion of the plunger. These caps are provided with ports 48 and 49, between which operates a double-faced valve 50, arranged in the space inclosed by the band between the planes of said ports and is adapted to be seated upon the inner surface of either cap according to the direction of movement of the plunger. In this construction the lower end of the body portion of the plunger is closed by a disk 51, which carries a pendent lifting-rod 52, operating in a central guide 53 in the valve-seat 6^b, said valve-seat consisting of the exterior supporting-ring 54 and the inner shouldered ring 55, which holds in place the packing-ring 56, said shouldered ring being provided with the inlet-ports 57, which are controlled by an annular valve 58, mounted upon a tubular guide 59. The valve 58 may be seated by means of an actuating-spring 60 to bear at its upper extremity against a collar 61, threaded upon the guide 59.

The guides 59 and 53 are preferably integral with the ring 55 and are in alinement with each other to receive the lift-rod 52, which terminates at its lower extremity in an enlargement 62. The portion of the lift-rod below the plane of the cylinder valve-seat 6^b preferably operates in a tubular shield 63, having its lower end closed by a cap 64. A well-casing 38^b is preferably used in connection with this form of pump.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

I disclaim as a part of my invention the following subject-matter: In a pump, the piston with oil-passage therethrough from end to end and internally screw-threaded at its lower end and provided with a collar screwed thereinto with oil-passage therethrough and forming an inward projection to engage the head of the standing valve-rod to lift it.

Having described my invention, what I claim is—

1. The combination with a double-acting pump-barrel, of upper and lower inlet-valve seats removably fitted in the barrel and adapted to be upwardly displaced, the lower seat being of smaller diameter than the upper, a plunger for operating in the barrel between the valve-seats and having a valved tubular portion extending through the upper seat, the upper valve-seat being in the path of and adapted to be engaged and elevated by the plunger when the latter is elevated beyond the limit of its stroke, and loose connections between the plunger and the lower valve-seat whereby the latter may be displaced and suspended, substantially as specified.

2. The combination of a pump-barrel provided with terminal upper and lower castings forming downwardly-tapered valve-seat rests, the upper casting having its lower end reduced and provided with inlet-openings, a jacket approximately equal in diameter with the upper portion of the upper casting and secured thereto to inclose said inlet-openings, the lower end of the jacket being provided with a strainer, upper and lower valve-seats removably fitted in said rests, a hollow plunger operating in an opening in the upper valve-seat and provided with a head operating be-

tween the planes of the valve-seats, and connections between the plunger and the lower valve-seat, substantially as specified.

3. The combination with a pump-barrel, of upwardly-displaceable upper and lower cylinder inlet-valve seats removably mounted in the barrel, a plunger having a tubular body portion operating in a central opening in the upper valve-seat and provided at its lower end, between the planes of the valve-seats, with a head in the path of which the upper valve-seat is arranged, and a lifting-rod fixed to the lower valve-seat and extending upwardly into the tubular body portion of the plunger through a guide carried thereby and terminating in a head or enlargement to limit the relative separation of the plunger and the lower valve-seat, substantially as specified.

4. The combination with a pump-barrel, of upwardly-displaceable upper and lower cylinder inlet-valve seats removably mounted in the barrel, the upper valve-seat being provided with a shoulder 29, a plunger having a tubular body portion operating in a central opening in the upper valve-seat and provided with a plunger-head fitting snugly in the barrel, said plunger-head being provided with an upwardly-extending flange 28 to engage said shoulder, and loose connections between the plunger and the lower valve-seat for limiting the relative separation thereof, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM C. WOODWARD.

Witnesses:
M. H. WOODWARD,
EUGENE BARRY.