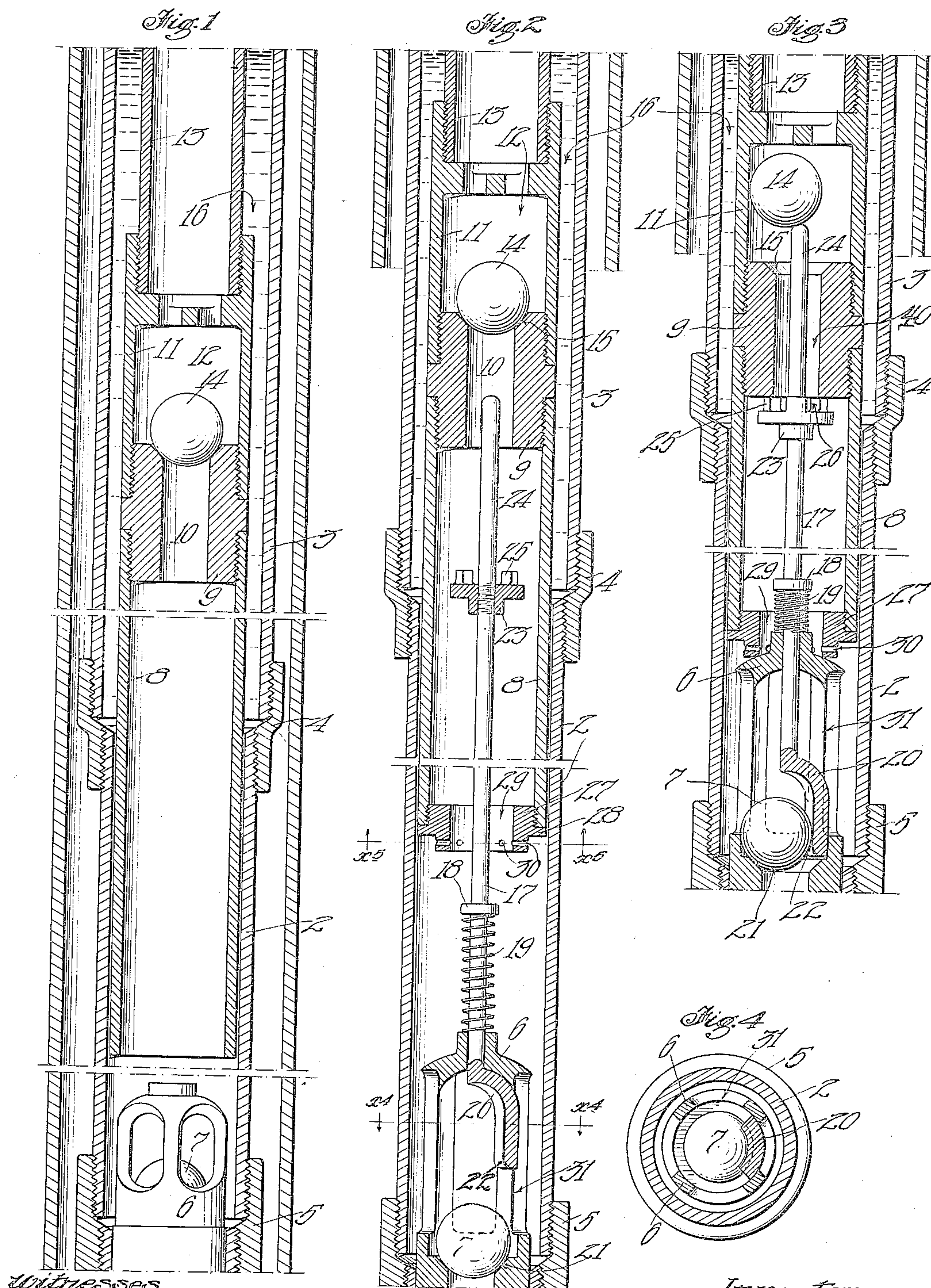


No. 880,019.

PATENTED FEB. 25, 1908.

R. S. FUTHEY.
PUMP FOR OIL WELLS.
APPLICATION FILED MAY 11, 1905.

2 SHEETS—SHEET 1.



Witnesses
J. M. Mansfield
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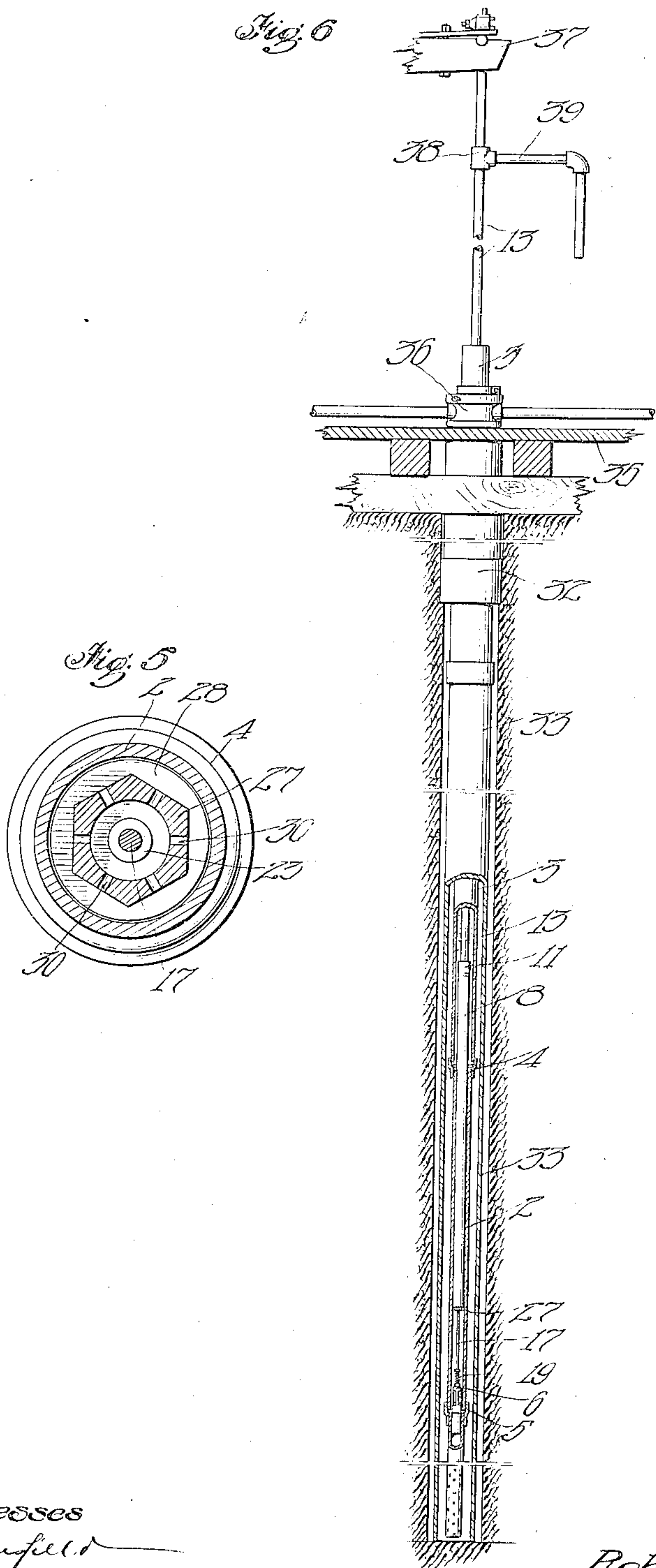
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Robert S. Futhey
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Frank C. Graham:

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UNITED STATES PATENT OFFICE.

ROBERT S. FUTHEY, OF LOS ANGELES, CALIFORNIA.

PUMP FOR OIL-WELLS.

No. 880,019.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed May 11, 1905. Serial No. 259,873.

To all whom it may concern:

Be it known that I, ROBERT S. FUTHEY, a citizen of the United States of America, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain Improvements in Pumps for Oil-Wells, of which the following is a specification.

This invention relates to means for pumping oil from deep wells, and particularly to such means adapted for use in deep wells, and for pumping heavy, hydrocarbon oils with which water and oil sands are commingled; and the primary object of the invention is to provide means for preventing the sand and water from working up between the pump plunger and the working barrel, and thereby preventing the cutting of the working barrel or plunger so as to cause the pump to leak and become inoperative.

In the operation of oil wells, particularly in the drilling of oil wells in southern California, great difficulty is experienced owing to the presence of more or less water and sand which are pumped up with the oil, and the water and sand working up between the plunger and the working barrel, and resulting in the cutting out of the plunger and working barrel and causing the same to leak. To obviate this difficulty, I have designed a pump in which the working barrel and plunger are packed with a fluid packing, for instance, oil, which will prevent the sand and water working up around the plunger and working between the plunger and working barrel.

Primarily, the invention consists in providing the working barrel with an enlarged extension at the upper end which may be filled with oil.

The invention further consists in means for unseating the standing valve and piston valve when it is desired to permit the oil in the pump to flow back down into the well and clear the valve seat.

The invention consists further in the constructions and combinations of parts hereinafter described, and particularly pointed out in the claims, and will be more readily understood by reference to the accompanying drawings forming part of this specification, and in which:

Figure 1 is a longitudinal, sectional view of a pump embodying my invention, the same being shown in a well casing. Fig. 2 is a similar view showing my improved means for unseating the standing valve and piston

valve in the pump, such means being shown in the position the same assumes when the pump is in operative position for pumping. Fig. 3 is a similar view showing such means in position holding the valves off their seats. Fig. 4 is a cross sectional view on line x^4-x^4 , Fig. 2. Fig. 5 is a cross sectional view on the line x^5-x^5 , Fig. 2. Fig. 6 is a view of one of my pumps connected for use in a well, portions of the apparatus and well casing being shown in longitudinal section to illustrate the construction, and portions of the pumping apparatus being broken away for clearness.

As shown in Fig. 1, the working barrel of the pump is made up of two sections of pipe 2, 3, the latter being of the larger diameter. These two sections of pipe are connected together by a reducing collar 4. The lower end of the working barrel is provided with the usual shoe 5 in which is mounted the standing valve-cage 6 having a standing-valve 7. The valve cage 6, valve 7 and the valve seat thereof may be of the ordinary or any preferred construction.

The pump plunger is preferably made up of a hollow section 8 adapted to work within the part 2 of the working barrel, and connected at its upper end with a nipple 9, which nipple 9 has a central duct 10 of considerably less diameter than the diameter of the plunger 8. The upper end of the nipple 9 is threaded and adapted to receive the lower end of a valve-cage 11, which cage is formed with an imperforated, peripheral wall with a series of ducts or passages leading into the main chamber 12 of the cage. 14 represents a valve in the chamber 12 adapted to seat in the valve seat 15 at the upper end of the duct 10. The upper end of the cage is internally threaded to receive the end of the pipe or casing 13 forming an upward hollow extension of the hollow plunger 8. It is thus seen that with this form of pump the oil drawn up through the standing-valve passes into the chamber of the hollow plunger and is not permitted to again come into communication with the working barrel of the pump after having passed into the hollow plunger, so that the only necessity for packing the pump is to provide against the sand and water working up between the interior of the section 2 of the working barrel and the section 8 of the hollow plunger. This I accomplish by filling with oil or other liquid the chamber 16 formed between the inner

surface of the section 3 of the working barrel and the outer periphery of the plunger. It will be understood from Fig. 6 that the chamber 16 inside the working barrel 3 extends approximately the height of the lift upon the plunger; viz., nearly to the outlet 39 of the pump. This oil slowly works down between the periphery of the section 8 of the plunger and the interior surface of the section 2 of the working barrel, and prevents any sand and water working up therebetween, and by thus packing such working barrel and plunger it has been found in actual experience with my pump in oil wells that the life of a pump so constructed is very much lengthened and have been able to pump wells in which it was impossible to use any of the pumps heretofore constructed, because of the presence therein of large quantities of sand and water which work up between the working barrel and the plunger and cut the surfaces thereof, causing the same to leak and ruining such pumps for actual use. In some of these wells the pump of ordinary construction would not last eight hours, while pumps of my construction have been continuously operated for twenty-four hours a day for over three weeks' steady run.

In Fig. 2 I have shown the same means for packing the working barrel against the action of sand and water, and have also shown means for unseating the standing-valve and permitting all the oil in the pump to flow back into the well when it is desired to withdraw the pump from the well or to flush the valve-seat of the standing-valve. This means consists in the provision of a rod 17 which extends upward through the top of the valve-cage 6, and is provided with a collar 18 between it and the top of the valve-cage and about the rod 17 is a coil spring 19 normally holding the rod in elevated position. The lower end of the rod is in the form of a curved wing 20 corresponding to the shape of the valve-cage and adapted when the rod is depressed to slide in between the valve 7 and the wall of the cage 6 and cause the valve 7 to rise away from the valve-seat 21, permitting the oil in the pump to flow downward through such valve-seat 21. The wing 20 at the inner side of its lower edge is beveled or rounded, as at 22, so that the same will more readily pass between the ball valve and the cage and cause the valve to rise.

The upper end of the rod 17 is connected by means of a collar 23 with an extension 24 of the rod adapted to extend through the duct 10 and raise the ball 14 from the valve-seat 15 when the pump plunger is lowered to cause the standing-valve to be held open, it being necessary that both the valve 14 and the standing-valve 7 should be open in order to permit the free passage of the oil downward out of the pump.

The collar 23 is provided with a series of

projections 25 on its upper face, these projections being spaced apart to form oil-ways 26, so that when the under surface of the nipple 9 contacts with the top of the lugs or projections 25 (as shown in Fig. 3), the oil flowing downward through the duct 10 may flow out through the ducts 26. When this valve-operating means is used it is preferable to provide the end of the hollow plunger with means adapted to contact with the top of the valve cage 6 and prevent the downward movement of the plunger after the valve 7 has been raised and before the wing 20 comes in contact with the valve-seat 21, thus preventing any possibility of either breaking the wing 20 or ruining the valve-seat 21. This means is preferable in the form of nipple 27 adapted to screw into the lower end of the section 8 of the plunger, and provided with shoulders 28 adapted to butt against the end of such section. This nipple is provided with a central duct 29 and with a series of lateral ducts 30 opening at the side of the nipple 27 and below the lugs or shoulders 28, so that when the nipple 27 rests on top of the cage 6, as shown in Fig. 3, the oil may flow down through the duct 29, out through the lateral or side ducts 30, through the open ducts 31 of the valve-cage 6, and thence through the seat 21 thereof.

In Fig. 6, I have shown one of my pumps connected up in an oil well. In this view, 32, 33, represent the several sizes of well-casing which have been used in drilling the well and casing the same. Above the platform 35 is the casing head 36, and the extension 13 of the plunger is shown as operatively connected with the end 37 of a walking-beam, and as having an outlet through the tee 38 and pipe 39.

In use, oil is poured down the casing 3 forming the extension of the working barrel until the same is substantially filled to the top. It will be noted that the oil pumped from the well through the hollow plunger is delivered to the sump-hole or other depository without any opportunity of any such oil working or leaking into the chamber formed by the extension 3 of the working barrel.

The enlarged extension 3 of the working barrel has an imperforate peripheral wall from the top of the well down to prevent mixture of the fluids outside the working barrel with the liquid packing within said extension. The liquid packing is therefore kept free from gritty substances, being supplied wholly at the top of the well through conducting means leading from a suitable supply, not shown.

I make no claim herein to:—

1. A pumping apparatus having a hollow plunger of a length to extend outside the well, a working barrel therefor having a snug-fitting lower portion, a liquid packing re-

ceiving chamber having an imperforate wall about a portion of said plunger above said snug-fitting portion, means being provided for supplying liquid to said chamber, a valve interposed in said plunger, a standing valve at the bottom of said working barrel, and means for reciprocating said plunger;

Nor to:—

2. The combination with the working barrel; a plunger in said barrel, a hollow sucker rod connected with the plunger, said plunger being provided with passages for the movement of liquid through it to the sucker rod; and means for maintaining a column of liquid above the plunger;

Nor to:—

3. The combination with the working barrel; a plunger in said barrel, a hollow sucker rod connected with the plunger, said plunger being provided with passages for the movement of liquid through it to the sucker rod; and means for continuously delivering and maintaining a column of liquid above the plunger;

Nor to:—

4. The combination with the working barrel; a plunger in said barrel, a hollow sucker rod connected with the plunger, said plunger being provided with passages for the movement of liquid through it to the sucker rod; and means for continuously delivering and maintaining a column of liquid above the plunger to make a column approximately the height of the lift;

Nor to:—

5. The combination with the working barrel; a plunger in said barrel; a hollow sucker rod connected with the plunger, said plunger being provided with passages for the movement of liquid through it to the sucker rod; a tubing connected with the working barrel approximately the height of the lift and surrounding the sucker rod, said tubing being adapted to maintain a column of liquid on the plunger;

Nor to:—

6. The combination with the working barrel; a tubing extending from the working

barrel to approximately the height of the lift, a plunger in the working barrel, said tubing being adapted to maintain a column of liquid on the plunger; means independent of the tubing for conveying the liquid to be pumped from the working barrel; and means for continuously delivering liquid to said tubing.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. A pump having a hollow plunger, a working barrel therefor, a valve cage in said barrel, a ball valve in said cage, a valve in said plunger, and a rod mounted in said valve cage and provided with a wing adapted to engage said ball to move the same from its seat, said rod being normally held in raised position and provided with a portion adapted to contact with the plunger.

2. A pump having a hollow plunger, a working barrel therefor, a valve-cage in said barrel, a valve therein, a valve in said plunger, said valve-cage carrying reciprocating means for unseating said valves, said means normally out of engagement with said valves and adapted to be operated by the extreme downward thrust of the plunger, and means carried by the plunger adapted to seat on said valve-cage and limit the downward thrust of the plunger.

3. A pump having a hollow plunger, a working barrel therefor, a valve-cage in said barrel, a valve therein, a valve in said plunger, a rod mounted in said valve-cage and provided with a wing to unseat the valve therein, said rod normally held in raised position and provided with a portion adapted to contact with the plunger and with a portion extending into said plunger and adapted to unseat the plunger-valve when the plunger is in its extreme lower position.

In testimony whereof, I have hereunto set my hand at Los Angeles, California this 3rd day of May 1905.

ROBT. S. FUTHEY.

In presence of—

FREDERICK S. LYON,
JULIA TOWNSEND.