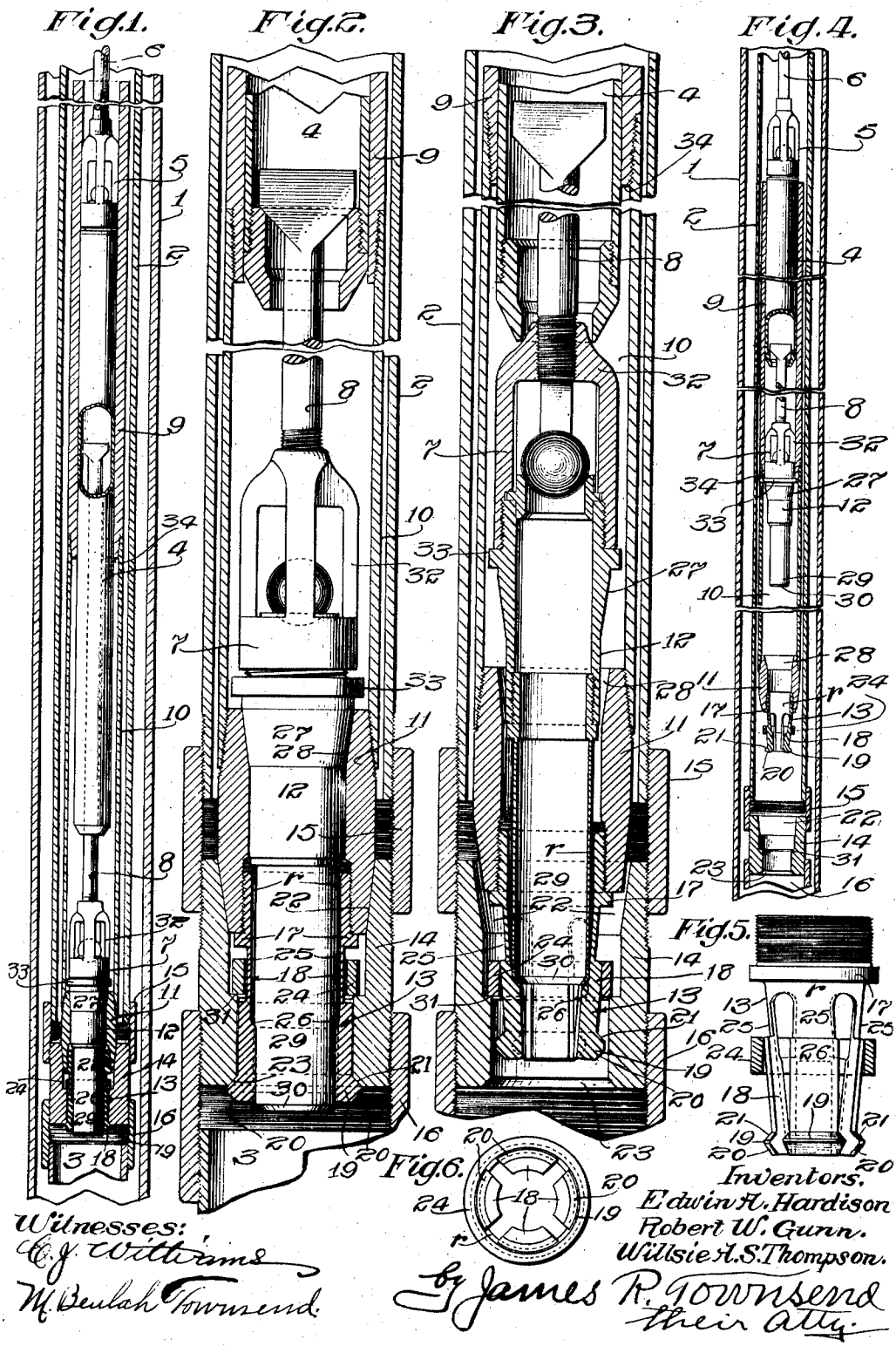
E. A. HARDISON, R. W. GUNN & W. A. S. THOMPSON.

DEEP WELL PUMP.

APPLICATION FILED MAY 25, 1908.

927,236. Patented July 6, 1909.



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UNITED STATES PATENT OFFICE.

EDWIN A. HARDISON, OF KERN, AND ROBERT W. GUNN AND WILLSIE A. S. THOMPSON, OF LOS ANGELES, CALIFORNIA.

DEEP-WELL PUMP.

No. 927,236. Specification of Letters Patent. Patented July 6, 1909.

Application filed May 25, 1908. Serial No. 434,990.

To all whom it may concern:

Be it known that we, EDWIN A. HARDISON, ROBERT W. GUNN, and WILLSIE A. S. THOMPSON, all citizens of the United States, and residents of the State of California, the former residing at Kern, in the county of Kern, and the two latter residing at Los Angeles, in the county of Los Angeles, in said State, have invented new and useful Improvements in Deep-Well Pumps, of which the following is a specification.

An object of this invention is to provide simple, convenient and effective means certain in action, whereby the pump may be readily inserted into the pump tubing and will become automatically locked in the pump-seat and thus be permanently secured in said tubing; and which will then hold the pump so locked as to allow the pump to be operated in the usual manner, and yet to allow the pump to be withdrawn whenever desired and to be repeatedly inserted, locked and withdrawn.

An object of the invention is to provide simple and satisfactory means for holding the standing-valve seated during the operation of the pump without the use of leather or other packing. It is to be understood, however, that any form of packing may be employed without avoiding the invention in its main features.

The invention may be embodied in various forms.

The accompanying drawings illustrate the invention in the form at present deemed most desirable.

Figure 1 is a broken view partly in section, showing a pump embodying this invention in working position in a well-casing, a portion of which is shown. The plunger is shown at the lower part of its stroke. Fig. 2 is an enlarged broken axial section of parts shown in Fig. 1. The standing-valve and the expander and frictional retainer are shown intact. The plunger is shown drawn up into position where a further upward movement thereof will start the standing-valve and the attached parts from their seat. Fig. 3 is a broken axial section showing parts in position just before seating and anchoring the working-barrel. The fingers of the retainer are retracted and held in place by the retainer-ring in the position they occupy before insertion into the tubing. The retaining-ring rests on the shoulders provided to hold the same, while a further downward movement of the working-barrel and its attached and contained parts may be effected to bring the parts into the position shown in Figs. 1 and 2. Fig. 4 is a broken axial section showing the parts in position they are in before the working-barrel and its attached and contained parts have been seated and while they are being lowered. In this view the standing-valve is suspended by the Garbutt attachment, and the working-barrel and its attached parts are supported by the shoulder of the standing-valve sleeve. Fig. 5 is a detail of the retainer detached and the finger retaining ring in position to hold the fingers retracted. Fig. 6 is a view looking upward at the bottom of Fig. 5.

1 designates the well-casing; 2, the pump-tubing; 3, the downward continuation of the tubing below the pump-seat; 4, the pump-plunger; 5, the working-valve of said plunger; 6, the sucker-rod; 7, the standing-valve, and 8 the Garbutt attachment for the standing-valve; all of which parts may be of the usual construction.

9 is the working-barrel provided with the working-barrel-coupling 10 which connects the working-barrel proper 9 with the pump-base 11, which base also forms the seat for a standing-valve-sleeve 12 and serves for attachment of the retainer 13.

14 is a seat for the pump-base 11, the same being permanently connected in the line of tubing 2, 3, by a coupling 15. Said pump-base seat 14 is screw-threaded at top and bottom for connection with the couplings 15 and 16 between the tubing 1 and the downward extension 3 thereof.

In the form shown, the upper end of the pump-base 11 is externally screw-threaded and the lower end is internally screw-threaded; the upper end being screwed into the working-barrel-coupling 10, and the lower end having the retainer 13 screwed thereinto. Said retainer may be provided with a shoulder 17 to butt against the end of the base. The retainer is provided with a plurality of flexible fingers 18, each provided with a projecting knob 19 having slanting lower and upper faces 20 and 21, the former to allow the fingers to readily pass into and through the seat member 14, and the latter to engage the lower end of said member as hereinafter explained. The seat member 14 is provided at the top with a downwardly-

tapering seat 22 for the pump-base, and at the bottom with an upwardly tapering seat 23 for the pump-retainer.

24 designates a retaining-ring to hold the fingers 18 compressed or inwardly retracted. Said fingers are provided with reduced portions 25 just below the shoulder 17 for the double purpose of allowing the fingers to bend readily and to afford a space in which the ring 24 may be accommodated when it is desired to bend the fingers 18 outwardly. Said fingers are provided internally with a downwardly-slanting shoulder 26.

The standing-valve-sleeve 12 is provided with a taper portion 27 to seat in the upper end of the pump-base 11 which is internally tapered as at 28 to seat the same with a tight joint. This taper portion and seat 28 may be ground to make a tight fit and prevent leakage. The lower portion of the standing-valve-sleeve 12 is of reduced diameter so as to leave clearance between such lower portion and the pump-base in order that the taper portion 27 may come to a firm seat in the seat 28.

29 is an expander and friction-retainer for the standing-valve sleeve. The same has a taper portion 30 at its lower end to engage the shoulders 26 of the fingers 18 and to rest thereon when said fingers 18 are compressed inward by the ring 24, thereby to prevent the expander from reaching a position to expand the fingers 18 so long as the fingers are compressed inward by the ring 24.

The pump-seat 14 is provided with an internal shoulder 31 to support the ring 24 and allow the fingers to move downward through said ring to position where the ring may be accommodated at the reduced portion 25 of said fingers, thereby to allow the fingers to be forced outward by the taper portion 30 of the expander, whereupon the expander may be forced on downward between said fingers to force the same outward, thereby bringing the upper slanting faces 21 of the knobs 19 into engagement with the upwardly-tapering seat 23 of the pump-seat 14. The fingers are so proportioned relative to the pump-base 11 and the pump-seat 14 that when the pump-base is firmly seated on the pump-seat the upper faces 21 will engage the tapering seat 23 while yet there is an open space between the fingers 18 and the bore of the pump-seat, so that the expansive force applied by the expander 29 on its downward movement will serve to wedge the parts tightly together, thus drawing the pump-base downward positively into its seat and allowing the expander 29 to be held frictionally between the retainer-fingers so that the standing-valve will be sufficiently anchored to prevent any tendency of loosening from or lifting from the pump-base in the ordinary operation of the pump, but yet leaving the standing-valve free to be withdrawn when the plunger is drawn up for that purpose. The expander 29 is tubular to allow a passage for flow of oil upward to the standing-valve, and is of approximately the same diameter as the bore of the retainer r above its shoulder 26 when the fingers are in retaining position, so that the expander 29 can only be moved downward into the retaining position shown in Fig. 2 by becoming bent inwardly at the places where it engages such shoulders. Said expander is therefore constructed of ductile material and constitutes bendable means adapted to wedge into the space between said fingers. The purpose of this is to insure the requisite friction between the seated expander and the retaining-fingers when the standing-valve sleeve is seated in the pump-base.

33 is a shoulder carried by the standing-valve, the same being preferably a projection from the standing-valve sleeve to engage the lower end 34 of the working-barrel 9 to support such barrel when the pump-base 11 is not seated.

In practice, when the fingers have been compressed and the ring 24 brought below the reduced portion 25 thereof, the parts may be suspended from the sucker-rod 6, as shown in Fig. 4, and the pump may be lowered into the tubing until the ring 24 engages the shoulders 31 and is thereby held from further descent while the working-barrel, the pump-base, the retainer, the plunger, the standing-valve and parts connected therewith continue to descend, and until the reduced portion 25 of the retainer r is brought inside the ring 24, and thereupon the base becomes seated in the seat member 14 with the upper faces 21 of the retainer-fingers in position to engage the tapering seat 23 at the bottom of the seat-member 14, in case the lower ends of the fingers are spread apart. The further lowering of the sucker-rod 6 and the plunger 4 allows the standing-valve and its attached parts to descend until the expander 29 engages the shoulders 26 of the retaining fingers, and then the further descent of the plunger brings the lower end thereof into engagement with the standing-valve-cage 32, and pressure is applied to force the expander downwardly so that its tapering end wedges past the shoulders 26, thereby expanding the fingers to bring the slanting wedge faces 21 against the seat 23, thereby drawing the pump-base down firmly into its seat. The expander will thus become crimped between the fingers 18, and will thereby be held friction tight against all ordinary upward force which might tend to unseat the standing-valve until the sucker-rod 6 is drawn upward for the purpose of unseating such valve. In this way the pump is put into permanent position from which it may be drawn and replaced an indefinite number of times.

We claim:—

1. Pump tubing provided with a pump base seat, a pump base to seat in said seat and provided with a retainer to engage the seat and movable means to hold the retainer in such engagement.

2. Pump tubing provided with a pump base seat, a pump base to seat in said seat and provided with a retainer to engage the seat and movable means carried by the standing valve to hold the retainer in such engagement.

3. Pump tubing provided with a pump base seat, a pump base to seat in said seat and provided with expansible fingers to engage the seat and movable means to hold the fingers in such engagement.

4. A pump comprising a seat, a pump-base to seat in said seat, retaining means carried by said pump-base and provided with faces to engage the seat, a ring adapted to hold said means out of engaging position, means in said seat to hold said ring to allow the engaging means to be moved out of engagement with said ring, and means to expand said engaging means to cause the same to engage said seat.

5. The combination with a pump-base and a working-barrel connected thereto, of a plunger, means to frictionally retain a standing-valve in said base, and means carried by the standing-valve to engage the working-barrel when the standing-valve is drawn upward therethrough.

6. The combination of a seat, a pump-base provided with means to engage the seat, and a standing-valve provided with means to frictionally engage said engaging means and to expand the same into position to engage said seat.

7. In a pump, a pump base, fingers connected with said base and provided with knobs and with reduced portions, a ring arranged to hold said fingers retracted, the same being adapted to be moved into said reduced portion, a seat to receive the base and the retaining fingers, said seat being provided with means to hold said ring while the fingers are moved into seat-engaging position, and a standing-valve adapted to seat in said base and provided with means to expand said fingers to engaging position.

8. The combination with a seat, of a pump base adapted to seat therein and provided with fingers to engage said seat, of a standing-valve adapted to seat in said base and provided with bendable means adapted to wedge into the space between said fingers.

In testimony whereof, we have hereunto set our hands.

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