

UNITED STATES PATENT OFFICE.

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DEEP-WELL LINER-PUMP.

1,064,071.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, EDWIN A. HARDISON, a citizen of the United States, residing at Bakersfield, in the county of Kern, State of California, and ROBERT W. GUNN and WILLIE A. SCOTT THOMPSON, citizens of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented a new and useful Deep-Well Liner-Pump, of which the following is a specification.

Objects of this invention are: to provide a pump of superior lasting qualities for use in deep wells; to exclude sand from the working parts; to permit the pump to be renewed in the field by readily removing the worn parts and replacing them with new, and to provide for cheaply renewing the worn parts.

Other objects and advantages may appear from the subjoined detail description.

The invention may be variously embodied.

The accompanying drawings illustrate the invention in the best form in which we at present contemplate embodying the same.

Figure 1 is a view of a pump embodying this invention, showing fragments of the pump tubing, the sucker rod and the anchor. The working barrel, the plunger and the valves are shown intact, and the pump base and the parts thereabove that encircle said intact parts, are shown in section. The plunger is shown in depressed position for seating the standing valve. Fig. 2 is an enlarged fragmental view broken and sectioned in parts to illustrate in detail the novel features. Fig. 3 is an enlarged sectional detail showing the upper end of the working barrel and parts adjacent thereto.

The pump base 1 is provided with a screw-threaded seat 2 into which an anchor may be screwed in the usual way, and is also provided with a standing valve seat having a tapered portion 3 and a cylindrical portion 4, and being also of usual construction, to receive the usual standing valve 5. Said pump base is provided at its upper end with a reduced externally screw-threaded portion 6 at the bottom of which is an internal channelled shoulder 7, the outer wall of the channel sloping downwardly and inwardly to a cylindrical neck 8 which is between said shoulder and the screw threads 9 of the reduced portion. Said pump base is also pro-

vided internally at the tip with a gain 10 to form a seat for a tubular filler 11 to reduce the bore in which the standing valve cage 12 and the lower end of the plunger 13 are contained.

The tubular extension 14 of the pump base is provided at its lower end with a threaded portion 15 terminating in a hollow cylindrical tip 16, the lower end of which is beveled to fit the channel seat 7 when the extension 14 is screwed home on the body of the base. The upper and lower ends of the extension 14 are duplicates so that either end may be screwed onto the base.

The tubular working barrel seat 17 is formed of a middle collar equal in external diameter to the pump base and provided at its extremities with external screw-threaded portions 18, 19, necks 20, 21 and channels 22, 23, which correspond to the parts 9, 8 and 7 of the pump base; said barrel seat is also provided in its lower end with an annular shoulder 24 corresponding to the annular shoulder 10 of the pump base, and is provided at its upper end with an internally screw-threaded working barrel seat 25 which is tapered to receive the tapered screw-threaded end 26 of the working barrel 27.

The working barrel case 28 is constructed at its lower end with an internally screw-threaded portion 29 and terminates in a hollow cylindrical tip 30 which is beveled to fit the seat 23. The upper end of the working barrel case 28 is provided with an externally screw-threaded portion 31 on which is screwed a packing collar 32 that is provided with an internal annular shoulder 33, and is provided below such shoulder with an internally screw-threaded portion 34 that screws onto the upper end of the working barrel case. The upper face of the shoulder 33 is provided with an annular bead 35 between which and the body of the collar is an annular channel 36.

The upper end of the packing collar 32 has a screw-threaded bore 37 of greater diameter than the screw-threaded seat 34 and into this is screwed a gland 38 which has an annular external shoulder 39 to fit the upper end of the packing collar 32. The lower end of said gland is provided with an annular bead 40 corresponding to the bead 35; and suitable packing 41, which may be of leather,

cotton fiber or other tough yielding packing material, is compressed in the cavity between the internal annular shoulder 33 and the gland 38, being between the upper portions of the working barrel 27, case 28, the gland 38 and the collar 32. The upper end of said gland 38 is provided with an internally screw-threaded tubing seat 42 into which the pump tubing may be screwed. A loose wear collar of hard metal is provided to exactly fit the plunger, and if deemed advisable by the constructor, such a collar may be employed at both top and bottom of the working barrel. In the drawings said wear collar is shown only at the top of the working barrel.

The working barrel 27 has a tapered externally screw-threaded portion 43 at its upper end and its tip 44 is machined so that the same extends in a plane normal to the axis of the working barrel so as to tightly fit the end of a wear collar 45, which is ground to fit the tip of the working barrel and to form a tight joint at 44; said wear collar 45 is ground internally and at its lower end, and the plane of such lower end is normal to the axis of the collar. The plunger 13 is ground externally throughout its entire length to exactly fit the bore of the wear collar 45 and the working barrel 27, which working barrel is also reamed perfectly true throughout its entire length. The bores of the working barrel and the wear collar fit the exterior of the plunger 13 when the pump is finally assembled. The working barrel is internally cylindrical, and tapers externally from the screw-threaded portion 26 of its lower end to the screw-threaded portion 43 of its upper end, and therefore the working barrel case 28 is not liable to become wedged against the working barrel 27 in case sand finds its way past the packing 41; and therefore, said case can always be readily unscrewed from the middle collar 17. A cap 46 having a taper screw-threaded seat 47 at its lower end to screw on the upper end of the working barrel is provided at its upper end with an inwardly projecting flange 48 which engages in an external gain 49 at the upper end of the wear collar 45 so as to hold said collar firmly in place on the upper end of the working barrel 27 when the collar is screwed home. The external diameter of the wear collar is less than the internal diameter of the cup 46 so that although the wear collar is held by the flange 48 against axial movement it is laterally adjustable. The plunger 13 is provided at its upper end with the usual valve comprising a cage 50 and valve stopper 51 and provided at its upper end with a screw-threaded stem 52 to receive the sucker rod, not shown.

In order to prevent sand from reaching the interior of the wear collar 45 at any

time, the plunger is made of unusual length relative to the working barrel, middle collar and upper base extension so that when the plunger is fully seated upon the standing valve cage its upper end still projects above the wear collar as shown in Fig. 1.

For practical operation the plunger will be drawn up after the standing valve has been seated thereby and will be connected with the walking beam or other operating device, not shown, so that at the lowest point of its stroke the lower end of the plunger will be six inches, more or less, above the top of the standing valve cage as is usual in mounting plungers in deep well pumps. Therefore, the top of the plunger will always be above the wear collar 45.

It is understood that the lower end of the plunger may be provided with a tapered tip 53 which enables the plunger to be readily inserted into the working barrel, through the sharp edged wear collar 45, and said tip 53 may be a grid or spider to form a seat for the usual Garbett extension, not shown, the body of which may slip through the tip, the lower end of said body being screwed into the screw-threaded seat 54 therefor in the upper end of cage 12.

The cap 46 has an internal chamber 55 of greater diameter than the collar 45 which is to be contained inside of said chamber; and the upper end of the wear collar 45 is reduced by a gain 49 into which the internal flange 48 seats; the reduced portion 49 being of less diameter than the flange 48 so that when the cap 46 is not quite screwed home the wear collar 45 can be moved laterally so that its bore will coincide with the bore of the barrel, and after the plunger has been inserted, the cap 46 may be screwed positively home, thus clamping the wear collar in place and preventing any further shifting thereof.

The working barrel 27 and working barrel case 28 are connected together at their lower ends by the middle collar 17; said collar and the base 1 are connected by the base extension 14 and the upper ends of the working barrel and its case are disconnected, except through the yielding packing 41, and therefore, the working barrel is practically free at its upper end to move slightly to aline with the plunger, the connection with the pump tubing being only through the case 28.

The pump base 1, the middle collar 17, packing collar 32 and packing gland 39 may all be made of cast-iron, or other suitable material, and said middle collar and packing collar are connected by the parts 14 and 28, which may be of any suitable material.

In the drawings *a* indicates the anchor and *b* the sucker rod.

The wear collar 45 is loose and readily adjustable to alinement before the cap 46 is

screwed home, so that the wear collar will align with the inside of the working barrel 27 when the plunger 13 is inserted through both. After the plunger is thus inserted and the wear collar aligned, then the cap 46 is screwed down to hold the wear collar in place, and in this way the alignment of the wear collar is kept true with the working barrel and as it fits the plunger, it holds the plunger in like alignment.

We claim:—

1. A pump comprising a pump base and working barrel case connected therewith, a working barrel in the case, a standing valve in the base and working barrel, means to connect the working barrel with the working barrel case, a wear collar at the upper end of and adjustable laterally relative to the working barrel, a cap to hold the wear collar in fixed relation to the working barrel and a plunger inside the working barrel and fitting the wear collar.

2. A pump comprising a pump base, a working barrel case connected therewith, a working barrel in the case, a standing valve in the base, means to connect the working barrel with the working barrel case, a loose wear collar at the upper end of the working barrel, a plunger inside the working barrel and fitting the wear collar, and means to hold the wear collar against axial movement, the plunger being of greater length than the distance between the top of the standing valve and the top of the working barrel.

3. A pump comprising a working barrel, a wear collar means fastened to the upper end of the working barrel to hold the collar against movement relative to the barrel, and a plunger fitting the working barrel and the wear collar.

4. A pump comprising a working barrel, a loose wear collar means fastened to one end of the working barrel to hold the wear collar in fixed relation to the working barrel, and a plunger fitting the working barrel and the wear collar.

5. A pump comprising a working barrel, a loose wear collar means fastened to the working barrel to hold the wear collar in fixed relation to the working barrel and a plunger fitting the working barrel and the wear collar.

6. In a pump, the combination with a working barrel and a plunger therein of a wear collar and means whereby said collar is fastened to the end of the working barrel and fitting the plunger.

7. In a pump, the combination with a working barrel screw-threaded at its upper end, of a plunger in the working barrel, a wear collar on the end of the working barrel and a cap screwed onto the working barrel and engaging the wear collar.

8. In a plunger pump, the combination

with a working barrel of a wear collar fitted to the end thereof, and a cap screwed on the working barrel to engage the collar and loosely fitting the collar so that the collar may be adjusted laterally before the cap is screwed home.

9. In a plunger pump, a working barrel and a wear collar of hardened steel and means whereby the wear collar is adjustably secured to the end of the working barrel; said collar being adjustable laterally.

10. In a plunger pump, a working barrel, a laterally adjustable hardened wear collar and means whereby the wear collar is fastened to the end of the working barrel.

11. In a plunger pump, a working barrel, and a laterally adjustable hardened wear collar fastened to the upper end of the working barrel.

12. In a pump, the combination with a working barrel of a hard wear collar, and means for securing said collar to the working barrel, said means being adjustable on the working barrel so that at one adjustment the wear collar is movable laterally and at another adjustment said collar is fixed.

13. In a pump, the combination with a working barrel provided at its upper end with a taper screw-threaded portion, of a wear collar mounted on said upper end, the joint between the collar and working barrel being in a plane normal to the axis of the working barrel, and a cap screwed onto the working barrel to hold the wear collar in place.

14. In a pump, the combination with a working barrel provided at its upper end with a taper screw-threaded portion, of a wear collar mounted on said upper end, the joint between the collar and the working barrel being in a plane normal to the axis of the working barrel, and a cap screwed on to the working barrel to hold the wear collar in place; said wear collar being provided at its upper end with a gain and said cap being provided with an internal flange to engage said gain.

15. A pump comprising a pump base having at its upper end a screw-threaded portion and a channeled shoulder below said screw-threaded portion; a base extension screwed onto said screw-threaded portion and beveled at its lower end to fit the channel; a middle collar, the lower end of which corresponds externally to the upper end of the pump base and is secured in like manner to the base extension; said middle collar conforming externally at both ends to the upper end of the base and being provided internally at its upper end with a screw-threaded seat for a working barrel, a working barrel screwed into said seat and provided with a screw-threaded portion at its upper end, a working barrel case corresponding at its lower end to the ends of the

base extension and screwed onto the upper end of the middle collar, a packing collar screwed onto the upper end of the working barrel case, and a packing gland screwed on the packing collar; said packing collar and packing gland forming a packing chamber; a working barrel inside the case, the packing collar and the gland; and packing in the packing chamber to close the space around the working barrel.

16. A pump comprising a pump base having at its upper end a screw-threaded portion and a channeled shoulder below said screw-threaded portion, a base extension screwed onto said screw-threaded portion; and beveled at its lower end to fit the channel; a middle collar, the lower end of which corresponds externally to the upper end of the pump base and is secured in like manner to the base extension; said middle collar conforming externally at both ends to the upper end of the base and being provided internally at its upper end with a screw-threaded seat for an upwardly tapering working barrel; a working barrel screwed into said seat and provided with a screw-threaded portion at its upper end; a working barrel case corresponding at its lower end to the ends of the base extension and screwed onto the upper end of the middle collar; a packing collar screwed onto the upper end of the working barrel case, and a packing gland screwed on the packing collar; said packing collar and packing gland forming a packing chamber; a working barrel inside the case, the packing collar and the gland; and a packing in the packing chamber to close the space around the working barrel.

17. In a plunger pump, a collar, a working barrel case fastened to the collar, a working barrel fixed at its lower end inside the collar and extending up through the collar and being free at its upper end; a collar fixed to the upper end of the case; a gland in the upper collar; and yielding packing between the upper portions of the working barrel and case, the gland and working barrel case.

18. In a plunger pump provided with a working barrel and a plunger in the working barrel, a movable hard wear collar around the plunger, and means to fix said collar relative to the working barrel after the plunger is inserted therein.

19. In a plunger pump provided with a working barrel and an elongated plunger in the working barrel, a short adjustable plane-faced, hard, wear collar around the plunger, and means to adjust said collar relative to the working barrel after the plunger is inserted therein.

20. In a plunger pump, the combination with a pump base, of a working barrel one end of which is rigidly connected with said base, a working barrel case also rigidly connected at one end with the base, a collar at the other end of the working barrel case, a gland screwed into the collar, and yielding packing held against the working barrel by the collar and gland.

21. In a plunger pump, the combination with the pump tubing and base of a middle collar connected with the base, a working barrel and a working barrel case connected at their lower ends with said collar and spaced apart at the top, pump tubing connected with the top of the working barrel case, a yielding packing between the upper ends of the working barrel and working barrel case, and a plunger in the working barrel.

22. A pump comprising a working barrel, a loose wear collar having at the top a reduced portion; and a cap having an internal flange and screwed onto the working barrel to hold the wear collar in place.

In testimony whereof, we have hereunto set our hands at Los Angeles, California, this 6th day of April, 1910.

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ROBERT W. GUNN.
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In presence of—
JAMES R. TOWNSEND,
L. BELLE RICE.