

UNITED STATES PATENT OFFICE

DANIEL L. LEWIS, OF LOVELL'S STATION, ASSIGNOR OF ONE-HALF HIS
RIGHT TO WILLIAM BOYNTON, OF PETERSBURG, PENNSYLVANIA.

IMPROVEMENT IN OIL OR OTHER DEEP WELL PUMPS.

Specification forming part of Letters Patent No. 191,448, dated May 29, 1877; application filed
February 22, 1877.

To all whom it may concern:

Be it known that I, DANIEL L. LEWIS, of Lovell's Station, in the county of Erie and State of Pennsylvania, have invented a new and useful Pump for Oil or other Deep Wells; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the construction of pumps for oil and other deep wells; and consists in certain improvements in the construction and arrangement of the parts forming the same.

Oil-well pumps are constructed at present in the following forms: First, with a barrel, a lower valve, and a working-valve, with a solid stem. Second, with a barrel, a lower valve, a working-valve, a solid stem, and a check-valve at the top of the barrel. (See Crocker patent, October 11, 1864, No. 44,610.) Third, with a barrel, a lower valve, and a stuffing-box at the end of the barrel, a working-valve above the barrel, and a hollow extension from said valve into the barrel through the stuffing-box. (See patent to Odell, December 17, 1872, and to Snow, December 18, 1866.)

My pump is constructed with a barrel, a bottom valve, a working-valve within the barrel, a hollow stem to the same, a stuffing-box in the end of the barrel, through which the hollow stem works, and a check-valve on the end of the hollow stem. The object and purpose of this construction will fully appear hereafter.

In addition to the above construction, I provide the pump, (or the tubing near the pump,) or parts adjacent to the pump, with an air-chamber, to serve as a cushion to relieve the tubing, sucker-rod, valves, and machinery above from the concussion caused by the action of the pumping-tools in the column of fluid.

My invention is shown in the accompanying drawing by one figure, which is a vertical and longitudinal section of the well-tubing, pump-barrel, and pump.

In this figure, A A represent the pump-barrel, and A' A' the well-tubing. B is the lower valve or bottom valve. C is the working-valve. D is the hollow stem of valve C; and D' is a basket, which forms an opening from

the chamber above the valve C to the hollow stem D, for the fluid to pass up through the same. E is the stuffing-box or plug which closes the top of the barrel, and through which the piston or valve stem D works. E' is the packing on the plug E. F is the check-valve, which I place on top of the hollow valve or piston stem D. G is a tube, which extends upward from the basket of valve F. It is closed at the top, and its mouth opens into the basket of valve F. This tube G is an air-chamber, and serves as a cushion to take up the concussion caused by the surging of the column of fluid during the work of pumping. H is the male screw by which the sucker-rod attaches to the pump.

The operation of my pump is as follows: The action of valves B and C are the same as any suction-pump. The fluid which passes through valve C does so on its downward stroke, and fills or enters the chamber above it, or between it and the plug E. When the valve C moves up, the fluid which is in the chamber above it is forced through the piston-stem D, and out through the valve F into the tubing above the plug. So, it will be seen, the pump discharges when going up.

When the pump comes down, the chamber above the valve C is empty, (or practically so,) and the valve F is closed, and is, in conjunction with the plug E, sustaining the column of fluid above it. For this reason I call the valve F a check-valve, for it does none of the work of lifting, but relieves the working-valve C of the work of sustaining the column, and leaves it free to do only the lifting and sucking work. The valve C being relieved of the work of sustaining the column of fluid, it is left free to fill easily on its downward stroke. This is not of so much importance when the well is producing enough to always fill the chamber between valves C and B. But in most wells this space is not filled by the up-stroke of the pump; consequently there is a vacuum formed below the working-valve.

The effect of this condition of things is that, when the sucker-rod and valves move down, with all the force received from the engine, the weight of the valves and rods themselves, and the pressure of the fluid, they meet with

no resistance (save friction) until the bottom of the vacuum or the top of the oil in the barrel is reached. Now, where but one valve is used on the hollow stem, as in the case of Odell, (*supra*), for example, the whole weight of the column of fluid upon the valve-ball must be raised before the valve can act. The result is, a severe concussion occurs, which is known as "pounding down." This gives a sudden shock and strain to the whole tubing and pumping machinery of the well, and is often the source of disaster. In my device no such shock or concussion occurs, for the valve C, when it strikes the fluid in the partially-filled barrel, has no weight or pressure upon its ball, and is free to act, and enters the fluid as easily as if there were no column of fluid above it.

In pumping this class of wells, the moving of the rods and valves in the tubing causes a surging or vibration of the fluid column, which, at the bottom of the well, strains the tubing, and often fractures it, and it also strains the rods and pumping machinery. To obviate this I introduce the tube G, which, as above explained, serves as an air-cushion. The mouth of the tube G being open, the fluid in the well can enter it, and as the sucker-rod goes down, the fluid is pressed up into the tube and the air compressed, and as the sucker-rod goes up, the fluid leaves the tube and the air expands. This tube could be filled with gas and made to perform about the same functions, which is to provide within an oil-well, or other deep bored well, a flexible substance at or near the bottom of the tubing, for the purpose of taking up or cushioning the vibrations of the column of fluid.

One part of my invention consists in the construction of plug E and the manner of seating it. It is made of a size to conform to the bore of the barrel A, and has a flange or shoulder, E'', to conform to the bore of the tubing A'. This shoulder E'' is provided with a packing, e, and the plug E has a packing, E', near its lower end. The piston-stem passes through a bore in the center of plug E, and the length of the piston-stem and lower valve C together is less than the length of the barrel A above valve B and the length of the plug

combined. So the shoulder of valve F will drive the plug E part way into the barrel, (enough to close it with the packing E',) and the pressure of the fluid will finish seating it. This construction insures the seating of the plug, and permits the valve C to come in contact with valve B, which is also necessary to prevent the clogging of valve B. (The two coming in contact serves to jar out any clogging matter that might lodge in valve B.) The object of the packing-ring e under the shoulder E'' is to prevent sand working below the shoulder a and above the packing E', which, if it accumulate there, renders the drawing of the plug difficult.

What I claim as my invention is—

1. An oil or other deep well pump, having a working-valve, C, and check-valve F, with connecting hollow stem D joining the same, and said valves operating one within and the other without the barrel A, as and for the purposes set forth.

2. An oil or other deep well pump, provided with a hollow piston-stem, D, which has a surrounding plug, E, closing the barrel, and is provided with a working or sucking valve, C, on its lower end, and a check-valve, F, on its upper end, as and for the purposes set forth.

3. Within an oil or other deep well casing or tubing, near the bottom of the same, a chamber filled with an elastic medium, for the purpose of cushioning the vibrations of the column of fluid, substantially as and for the purposes herein set forth.

4. The combination, with a deep-well-pump piston-rod, of the tube G, near the bottom or lower end of the same, filled with air or other elastic substance, substantially as and for the purposes set forth.

5. The combination of the plug E, piston-stem D, and valve B, the piston-stem being of such a length that its upper collar partially seats the plug just before the lower end strikes the valve B to seat or clear it, as set forth.

In testimony whereof I, the said DANIEL L. LEWIS, have hereunto set my hand.

Witnesses: DANIEL L. LEWIS.

JNO. K. HALLOK,
GEO. A. STURGEON.