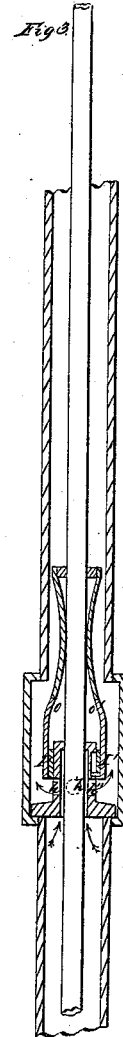
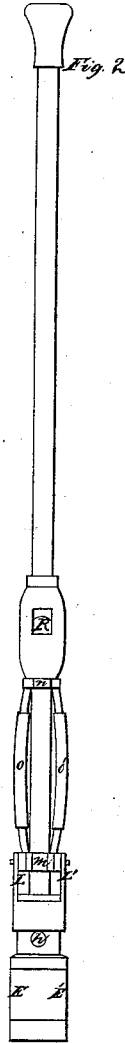
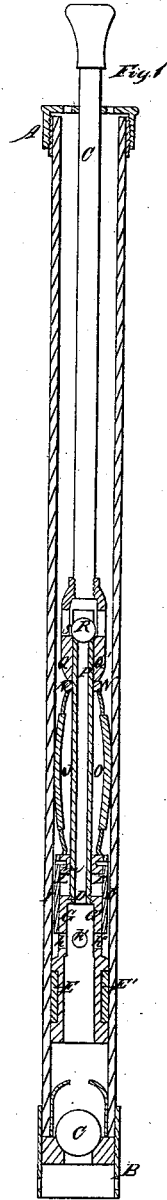


# R. Cornelius, Oil Pump.

N<sup>o</sup> 54,300.

Patented May 1, 1866.



Witnesses:

J. E. Shaw,  
George Buckley

Inventor:

Robert Cornelius

# UNITED STATES PATENT OFFICE.

ROBERT CORNELIUS, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN PUMPS FOR DEEP WELLS.

Specification forming part of Letters Patent No. 54,300, dated May 1, 1866.

*To all whom it may concern:*

Be it known that I, ROBERT CORNELIUS, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Valves for Oil-Pumps; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a sectional view of a complete pump with the improved parts in place. Fig. 2 is a side view of the piston-rod or pump-rod removed, showing the improved parts attached thereto. Fig. 3 is a sectional view of a stationary slide-valve, showing my improvement in a modified form.

In oil-pumps much trouble has been experienced from the fact that the weight of the column of oil and water in the well above the upper valve holds that valve down in its seat, and thus the gas generally present in all oil-wells enters through the lower valve into the chamber of the pump, and, being elastic and compressible, fills the chamber, and is alternately compressed and expanded by the ascent and descent of the piston, and thus no oil is raised from the well.

My improvement has for its object the overcoming of this difficulty by securing invariably the opening of a valve-passage from below to above the piston, so as to secure always the passage of any gas from below to above the piston during the descent of the piston. Heretofore the end has been attempted by additional or auxiliary puppet or ball valves variously arranged; but all of them are found to be more or less unreliable from the effect in them of the weight of the column of fluid above the valve.

My improvement consists in attaching to the pump-rod above the piston a slide-valve, which during the descent of the piston is positively forced to open valve-passages from below to above the piston, thus forcing any gas, as well as oil or water, that is below the piston in the chamber to pass through these passages during the descent of the piston. When the piston ascends these valve-passages are positively closed by the slide-valve, so that the gas, water, and oil above the piston must be alike forced up by the piston.

The feature of my invention is the employ-

ment of a slide-valve, in combination with the piston and piston-rod of oil-pumps, to secure a positive opening and closing of the tube-passage from beneath to above the piston, irrespective and independent of the weight of the liquid column above the piston in the well or tubing.

The slide-valve may be attached and operated in many ways, and I proceed to describe the mode of attaching and operating it which I prefer at present, and will then indicate other modified ways in which it may be applied and operated.

A B, Fig. 1, represents the ordinary pump-chamber of an oil-pump, with a lower puppet or ball valve at C, as is usual. I make no change in these parts. Into this chamber I insert a pump or piston rod, C D, to which is attached an ordinary piston, E E', surrounded by the ordinary leather packing. This piston is hollow, and instead of having a ball-valve I attach to the upper part of it a slide-valve arrangement, consisting of a prolongation of the body or narrowest part of the piston G G', having a series of apertures, *h h' h''*, which communicate between the interior of the lower side of the piston and the exterior of the piston above the packing. Over this prolongation of the piston G G' a collar, I I', slides, so as when down to cover the apertures *h h' h''* completely, and when up to open these passages. This collar I I' is attached to and operated by two projections, L L', and two small boxes, *m* and *n*, sliding on the piston-rod. These sliding boxes *m* and *n* are connected by a series of metallic bow strips or springs, O O'—say four or six in number, and about five inches long each. These springs are covered with leather and intended to touch at their outer periphery and press against the inner wall of the pump-chamber. Sufficient size and elasticity must be given to these springs for that purpose.

The piston-rod is hollow as far up as the point P, and a projection or flange, Q, is placed on the piston-rod, so as to leave a sufficient play on the exterior of the piston-rod for the slide-valve mechanism, composed of the collars or sliding boxes *m* and *n* and the springs, so that this mechanism can slide up and down the exterior of the hollow piston-rod and open and close the valve-openings *h h' h''*.

A ball-valve, R, is inclosed in a valve-cham-

ber, S. This valve is intended to be an independent auxiliary valve acting as the ordinary ball-valve does, so far as oil or water which passes up through the hollow piston-rod is concerned, but so far as concerns the passage of gas reliance is placed on the slide-valve openings *h h' h''* alone.

The operation of the improvement is as follows: When the piston-rod begins to descend through the pump-chamber the springs *O O'* slide in contact with the walls of the pump-chamber, and by their adhesion or friction the pump-rod for the first moment slides through the slide-valve collars *m* and *n*, and the passages in the slide-valve *h h' h''* are opened, so that the gas as well as oil or water from below the piston will pass through the piston and through the apertures *h h' h''* to above the piston. The whole piston and piston arrangement then slides together down through the chamber, the valve-passages *h h' h''* remaining open. When the piston begins to ascend the adhesion of the springs *O O'* against the walls of the pump-chamber at the first moment causes the piston-rod to slide through the valve arrangement, and thus closes the valve-passages *h h' h''*, so as to prevent the return of gas, water, or oil through these passages. After that the piston-rod, piston, and valve arrangement all ascend together for the rest of the stroke, the valve-passages *h h' h''* continuing closed during the remainder of the ascent of the piston.

The advantage here is over the puppet or ball valve that the slide-valve, being operated by positive mechanism, is in no way dependent for its action on the relative elasticity of the compressed gas within the chambers and the column of fluid above the valve.

It is manifest that the slide-valve may be

made to rotate by positive mechanism around the piston-rod instead of sliding vertically up or down. The slide-valve may be opened and closed by projections on the barrel or chamber of the pump instead of by or through the pump-rod, although I prefer to operate it through the medium of the pump-rod in consequence of the uncertain play of the walking-beam and machinery in use at oil-wells.

A stationary slide-valve may be used, instead of a valve attached to the piston-rod, by making the spring *O O'* to act, as shown in Fig. 3, by pressing against the pump-rod, the valve-seat resting on a projection, as shown in Fig. 3, and as the pump-rod descends it carries, during the first instant of descent, the collar *I I'* down over the valve-passages *h h' h''*, and during the first moment of ascent of the piston opens the valve-passages *h h' h''*, thus affording a certain positive opening and closing of the valve independently of the pressure of the fluid above.

Having thus described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

1. A slide-valve adapted for the passage of the gas, in combination with valve-gear operated upon by or through the piston-rod, for opening and closing the passages of said valve, substantially as described.

2. A slide-valve opened and closed by projections on the barrel or chamber of the pump, substantially as described.

3. The combination of the slide-valve and the friction-springs *O O'* for operating the same, substantially as described.

ROBERT CORNELIUS.

Witnesses:

J. E. SHAW,

GEO. BUCKLEY.