(No Model.)

J. S. THOMPSON.

PUMPING APPARATUS FOR WELLS.

No. 586,525. Patented July 13, 1897.

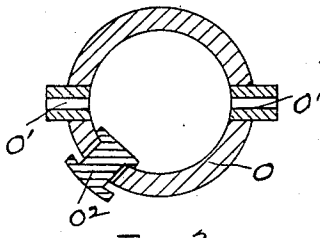

FIG. 3

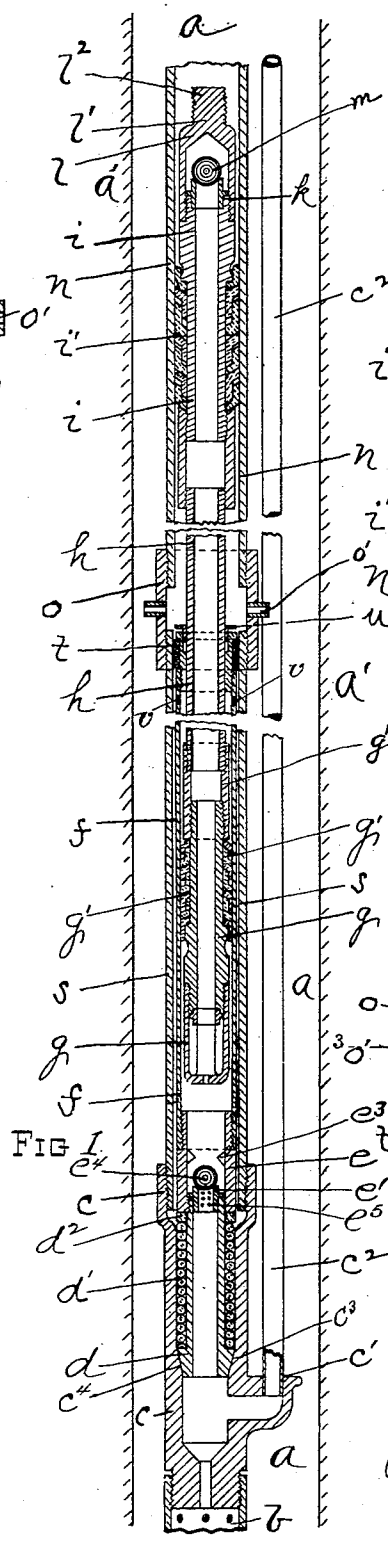

FIG. 1

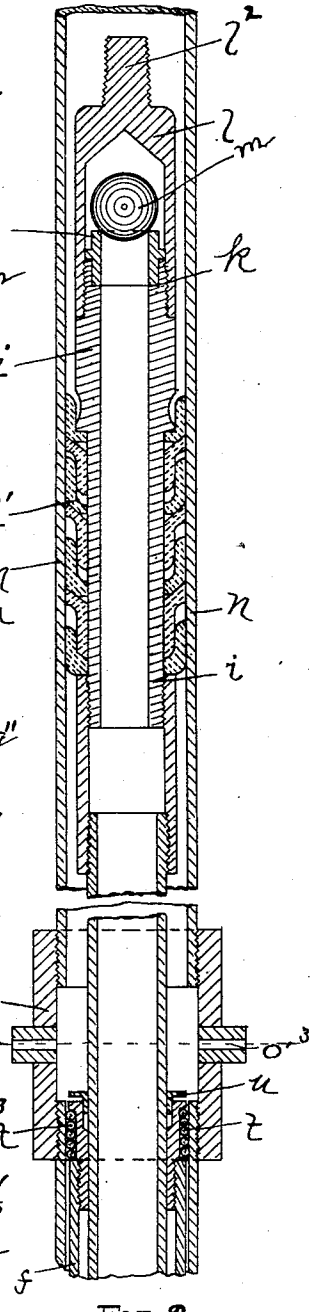

FIG. 2

Witnesses
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JAMES S. THOMPSON, OF TAYLORSTOWN, PENNSYLVANIA.

PUMPING APPARATUS FOR WELLS.

SPECIFICATION forming part of Letters Patent No. 586,525, dated July 13, 1897.

Application filed May 18, 1895. Serial No. 549,783. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. THOMPSON, a resident of Taylorstown, in the State of Pennsylvania, have invented a new and useful Improvement in Pumping Apparatus for Wells; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for pumping oil and like wells, and involves an invention for which I filed an application for Letters Patent of the United States on the 18th day of January, 1895, Serial No. 535,333.

My invention comprises, generally stated, a main upper working barrel having a pumping-piston working therein, a tube connected to said pumping-piston and having a piston of smaller diameter than said first-mentioned piston at the lower end thereof, and a second working barrel below, within which said smaller piston works, the space between the two working barrels being vented to preclude equalization of pressures.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a vertical section of my improved apparatus broken away. Fig. 2 is a like view enlarged. Fig. 3 is a section on the line 3 3, Fig. 2.

Like letters indicate like parts in each of the figures.

In the drawings, a designates the well, a' indicating the oil-sand from which the oil flows into the well. The pumping apparatus is located within this oil-sand. Below this oil-sand is the perforated tubing b, which extends down to any suitable distance and which has connected thereto another section of tubing which acts as an anchor for the pumping apparatus suspended above.

Secured within the upper end of the perforated tubing b is the casting c, said casting having the opening c' therein, to which the feed-pipe c^2 may be connected. This feed-pipe c^2 extends up to the top of the oil-sand or any suitable distance, in order that when the pumping apparatus is in operation the said feed-pipe will indicate, by admitting gas into the pump, when the oil has been sufficiently lowered in the well. Within the seat c^3 of the casting c is the brass anchor d, the lower end of said anchor being slightly inclined, so as to fit within the inclined seat c^4. Between the anchor d and the inner walls of the casting c is interposed the packing d', which may be of rope or other suitable material. This packing is held in position by a collar d^6, which fits down on the upper end of said packing. Connected to the upper end of the anchor d is the sleeve e, while resting upon the end of the anchor d is the valve-seat e'. The interior of the sleeve e is also provided with lugs e^3, which regulate the distance to which the ball e^4 may rise within said sleeve. Below the valve e^4 are the orifices e^5 for the purpose fully hereinafter set forth.

Secured to the upper end of the sleeve e is the inner working barrel f, said working barrel extending up to a suitable height, as will more fully hereinafter appear.

The piston g fits within the working barrel f, said piston being provided with the leather cups g', which form a packing for the same. This piston g is connected by the sleeve g'' to the lower end of the tube h and has an opening therein leading into said tube.

The upper end of the tube h is connected to the piston i, which is of larger diameter than the piston g. The piston i is also provided with the leather cups i', which act as packing. The upper end of the piston i is provided with the valve-seat k and held in position by means of the cap or crown l, which is secured to said piston, while a ball m rests on said valve-seat k. The cap l is provided with the extension l' and the threaded connection l^2, to which the sucker-rod or cable is connected. The piston i fits within the outer working barrel n, which forms part of the casing, but which is polished on the interior to allow for the working of the piston i therein. The washer or sprayer o is located between the working barrel n and the tubular section s, said sprayer being in the form of a sleeve and having the orifices o' located at suitable intervals apart. The sprayer o is also provided with the valve o^2, which will permit of the entrance of fluid into the sprayer, and also into the space between the outer walls of the tube h and the inner walls of the work-

ing barrel *n* upon the upward movement of the piston *i*, and upon descent of said piston the fluid will be ejected with force from said orifices. The tubular section *n* is connected by the sleeve *o* with the tubing *s*, which is connected to the casting *c*. The inner working barrel *f* extends up to a point a little below the orifices *o'*, and suitable packing material *t* is interposed between the outer walls of said working barrel *f* and the tubular section *p*. A suitable stuffing-box *u* surrounds the tube *h* in order to form a tight connection between said tube *h* and the working barrel *f*.

The working barrel *f* has the orifices *v* formed therein, which open communication between the space between the tubing *s* and the said working barrel *f* and the space between the tube *h* and the said working barrel, so that upon the reciprocation of the pistons the fluid is free to enter and pass from said spaces.

The mode of operation of my improved device is as follows: The piston *i* is connected up in any suitable manner with the ordinary walking-beam. Upon the reciprocation of the piston *i* and the tube *h* the smaller piston *g* reciprocates in the working barrel *f*, and as the piston *i* and tube *h* are raised the fluid is drawn through the feed-pipe c^2 up through the valve *e'* into the working barrel *f*, whereupon upon the descent of the piston *i* and the tube *h* the fluid is forced up through said tube and out through the openings in the crown *l* into the tubing leading to the top of the well. Also upon the raising of the piston *i* the fluid is drawn in through the valve o^2 and orifices *o'* of the washer or sprayer *o* and fills the space between the tube *h* and the outer working barrel *n*, so that upon the descent of the piston *i* the fluid will be ejected from said orifices and agitate the fluid in the well. This will prevent the formation of paraffin, which clogs up the crevices and prevents the flow of the oil from the sand.

By the construction described I obtain quite a large space above the sprayer between the tube *h* and the working barrel *n* for the entrance of the fluid through the orifices *o'* and valve o^2, so that quite a volume of fluid is ejected from said openings when the piston descends. Furthermore, upon the upstroke of the pistons *l* and *g* fluid which had been admitted through the orifices e^5 to the space between the casing *s* and working barrel *f*, and thence through the openings *v* to the space between the tube *h* and the working barrel *f*, is forced from said space between the tube *h* and working barrel *f* out into the space between the casing *s* and working barrel *f*, a corresponding amount of fluid in said last-mentioned space passing out through the orifices e^5. Upon the downstroke of the pistons the reverse occurs.

In employing a wire rope for operating the pumping apparatus I am enabled to hold the rope taut during the pumping operation for the following reasons: As the piston *i* is raised the wire rope of course is maintained taut and upon the descent of the piston *i* there is a very heavy column of fluid above said piston to carry it down, while the fact that the piston *g*, which reciprocates in the working barrel *f*, is of smaller diameter than the piston *i* and the orifices *o'* allow for the escape of the fluid, the descent of said piston *i* will be positive and without jerks. This difference of area within the piston *i* and the piston *g* prevents the equalization of the pressures and permits the superincumbent column of fluid of the piston *i* to act to lower the same, thus always holding the line taut.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In well-pumping apparatus, the combination of a working barrel, a pumping-piston working therein, a tube connected to said pumping-piston and extending down therefrom, a piston of smaller diameter than said first-mentioned piston on said tube, and a second working barrel below said first-mentioned working barrel within which said smaller piston works, the space between said working barrels being vented, substantially as set forth.

2. In well-pumping apparatus, the combination of a working barrel, a pumping-piston working therein, a tube connected to said pumping-piston and extending down therefrom, a piston of smaller diameter than said first-mentioned piston on said tube, and a second working barrel within which said smaller piston works, said apparatus having a vent to preclude equalization of pressures, substantially as set forth.

3. In well-pumping apparatus, the combination of a working barrel, a pumping-piston working therein, a tube connected to said pumping-piston and extending down therefrom, a piston of smaller diameter than said first-mentioned piston on said tube, said apparatus having spraying-orifices therein, and a second working barrel below said orifices within which said smaller piston works, substantially as set forth.

4. In well-pumping apparatus, the combination with a suitable casing, of a working barrel, a pumping-piston working therein, a tube connected to said pumping-piston and extending down therefrom, a piston of smaller diameter than said first-mentioned piston on said tube, said casing having orifices therein, a second working barrel below said orifices within which said smaller piston works, and packing between said second working barrel and said casing, substantially as set forth.

In testimony whereof I, the said JAMES S. THOMPSON, have hereunto set my hand.

JAMES S. THOMPSON.

Witnesses:

MINNIE A. LEONARD,

ROBERT GIBSON.