S. BUCKLEY & P. H. LAWRENCE.

Oil Tool Extractors.

No. 140,345. Patented July 1, 1873.

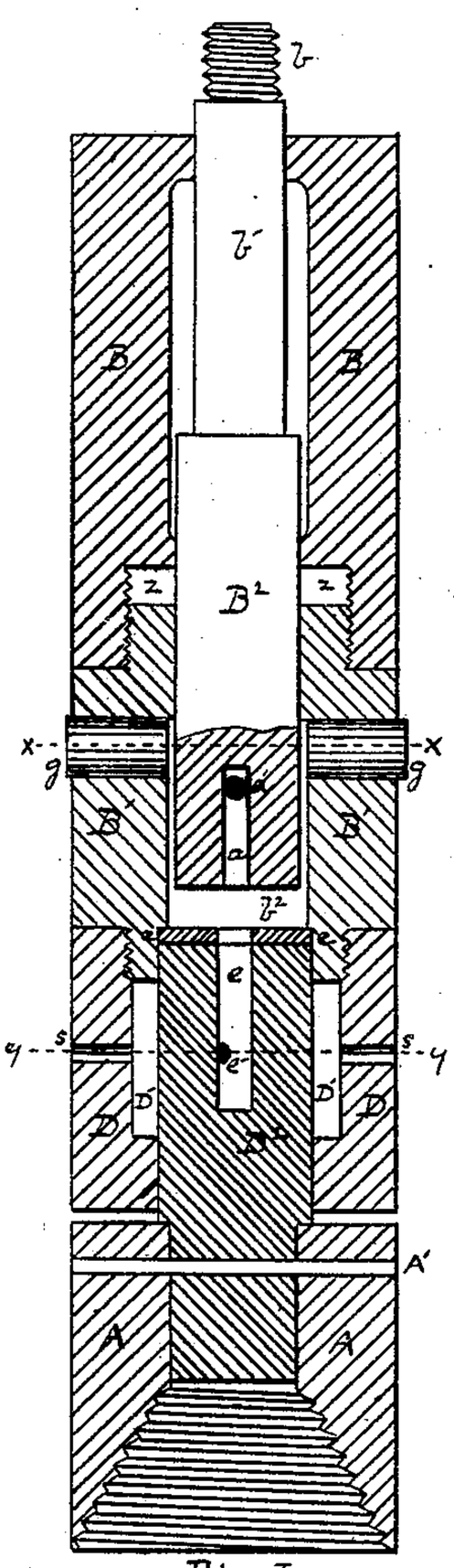

Fig. I.

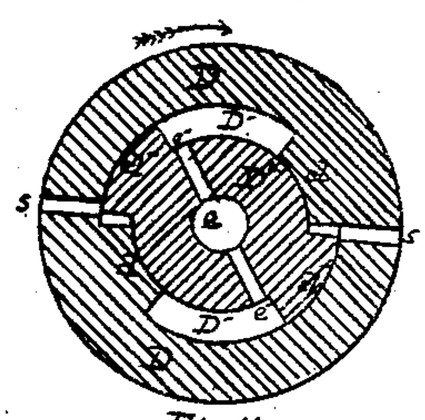

Fig. 4.

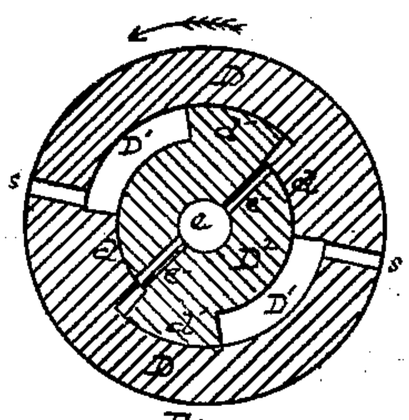

Fig. 3.

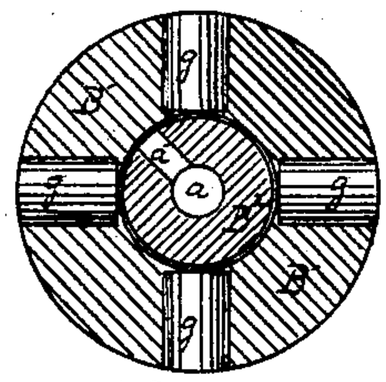

Fig. 2.

WITNESSES

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SAMUEL BUCKLEY AND PERLEY H. LAWRENCE, OF LAWRENCEBURG, PA.

IMPROVEMENT IN OIL-TOOL EXTRACTORS.

Specification forming part of Letters Patent No. **140,345**, dated July 1, 1873; application filed March 5, 1873.

To all whom it may concern:

Be it known that we, SAMUEL BUCKLEY and PERLEY H. LAWRENCE, of Lawrenceburg, in the county of Armstrong and State of Pennsylvania, have invented a new and useful Improvement in Oil-Tool Extractors; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a vertical sectional elevation of our improved apparatus. Fig. 2 is a horizontal sectional view in the line *x x*, Fig. 1, in the plane of the spikes, which, when forced outward, bear against the walls of the well; and Figs. 3 and 4 are horizontal sections in the line *y y*, Fig. 1, and through the holes or ports through which water passes into and out of the piston-case or chamber, and showing the pistons in different positions.

Like letters of reference indicate like parts of each.

In the sinking of oil, salt, and other artesian wells it frequently happens that the drilling-tools stick fast in the well. As such tools are commonly made of immense weight it is exceedingly difficult, especially at great depths, to remove them. When grappling devices fail the next resort commonly is to a cup-shaped female-screw die. This is attached to a set of pole-tools, which are made of sections or lengths of heavy round-iron rods or bars, united by a threaded pin-and-socket joint. The end in view is to rotate the die from the mouth of the well by means of the line of rods till it shall cut a screw-thread on and screw onto the upper end of such part of the tools as may be left in the well, the inclination of such thread being the reverse of that by which the tools in the well are screwed together. When this is done the rotation is continued for the purpose of unscrewing the drilling-tools, so as to take them out piece by piece. The cost of such pole-tools, especially for deep wells, the comparatively small torsional strain which they will withstand, the difficulty of transporting them from well to well in the oil-mining districts, are so great as to constitute a serious impediment to their general use.

We, in our improvement, make use of the same cup-shaped female steel screw-die A, and for the same purpose, viz: To cut a thread on and screw onto the upper end of such part of the tools as may be left in the well, and, by taking a firm hold thereon, afford means by which the tools may be unscrewed and lifted out of the well, piece by piece; and our improvement consists in attaching this die, or a suitable grappling device, to the rotating piston-stem of a hydraulic pump; and in the features of the construction and operation of such a pump, substantially as hereinafter described and claimed.

To enable others skilled in the art to make and use our invention, we will now proceed to describe its construction and mode of operation.

B B^1 represent a pump-barrel, in which works, by an up-and-down motion, a pumping-plunger, B^2. The upper end *b* of the latter is threaded, so that a line of sucker-rods can be screwed thereon, and which really form a stem to the plunger. Below the threaded part *b*, a section, b^1, is made square or of other than circular shape, and this section plays up and down through a correspondingly-shaped hole in the upper end of the pump-barrel B. This barrel, for convenience in fitting up, is made in two pieces, B B^1, and screwed together, with a stuffing-box, *z*, between for packing the plunger B^2. The pumping-chamber proper is represented at b^2. A piston-barrel, D, is screwed or otherwise fastened to the lower end of the pump-barrel B B^1. This barrel has a chamber, D^1, preferably somewhat larger than the chamber b^2 above. Extending up and down its inner periphery, and affixed thereto, is a pair of wings, *d d*, which constitute mechanically a pair of pistons. The inner edges of these wings make a close joint with the piston-stem D^2. This stem is of less diameter than the chamber D^1, and works therein by a rotatory motion—that is, it revolves therein, but by an intermittent motion. So much of this stem as projects into the chamber D^1, has affixed thereto a pair of wings, *d′ d′*, which act as pistons, to effect the rotation of the stem D^2. The outer edges of these wings are turned to work accurately against the inner periphery of the barrel D. The lower end of this barrel is closed, except at the hole through which the stem D^2 projects, and to the projecting lower end of this stem the die A is securely fastened by a pin, A′, or in other suitable way.

Returning now to the pumping-barrel B^1, a series of holes are bored radially through it, and these holes are occupied by a corresponding number of spikes, *g g*, which move endwise, like as many plungers or pistons. They work closely in their holes, or may be suitably packed, like pistons, if so desired, to prevent loss of power by leakage. The chamber b^2, from at or about where these holes enter, is bored a very little larger than the plunger B^2. A small water port or hole, *a*, is bored a short distance up into the plunger B^2, and thence it leads out by a lateral port, *a'*. The upper end of the rotating stem D^2 closes the lower end of the pumping-chamber b^2, and to insure a water-tight joint at that point a packing-disk, *c*, is introduced of leather, India rubber, or other suitable material. An open water-port, *e*, leads from the pumping-chamber b^2 down through this packing-disk, and vertically down through the rotating stem D^2 to about the middle of the chamber D^1. Here it divides, and by two ports, *e' e'*, leads radially out to the chamber D^1. These ports *e' e'* open into the chamber D^1 immediately at the diagonally-opposite faces of the piston-wings *d' d'*, as shown in Figs. 3 and 4. Also, two ports *s s*, as shown in the same figures, are bored through the barrel D. These ports enter the chamber D^1 immediately at the diagonally-opposite faces of the piston-wings *d d*, and it will be seen from the drawing, that while each port *e'* opens into the chamber D^1 on one side of a piston-wing, *d* or *d'*, the corresponding one of the other ports *s* opens into said chamber on the other side of the same wing. Hence there is no inside communication between the ports *e'* and the ports *s*.

In operation, the devices shown are lowered into the well until the die A rests on the projecting upper part of the tools in the well. The plunger *b* is then up, in which position the port *a'* comes above the packing *z*. Water then flows from the upper chamber of B, which need not be close, through the ports *a' a*, into and fills the chamber b^2; or, if the chamber b^2 is made with water-tight joints, it is filled before the device is lowered. When the desired position is reached, the plunger B^2 is forced downward, as in ordinary pumping. The first result is that the water in the chamber b^2 is forced up around the lower end of the plunger B^2, in a thin film, against the inner or base ends of the spikes *g*; or other suitable means of communicating water-pressure from the chamber b^2 to the base ends of the spikes may be employed. In any case, the pressure of the water so communicated forces the spikes *g* directly outward till their outer ends bear against the walls of the well, by means of which the parts B B^1 and D are prevented from rotating, while the second result is in progress, as follows: The downward stroke of the plunger B^2 continuing, water is forced from the chamber b^2 through the ports *e e' e*, into the chamber D^1, and between the adjacent piston-wings *d* and *d'* on each side, as illustrated in Fig. 3. The wings *d* being affixed to the barrel D, and the latter being held by the spikes, as above explained, connot move. Hence the piston-wings *d'* must move in the direction indicated by the arrow, in Fig. 3, to the position shown in Fig. 4, thereby causing the rotation through the same length of motion of the stem D^2, and through it of the die A, and thereby commencing the work of cutting a thread on the upper projecting end of the drilling-tools. In this way the die is made to take a bite on the drilling-tools sufficiently firm to hold it in the position thus given to it, while the piston-wings are brought to the proper relative position for a new cutting-stroke. To do this, the plunger B^2 is raised as for a new downward stroke. The first result is to relieve the pressure on the basis of the spikes *g*. The water which, under pressure, bore against their bases, now flows back into the chamber b^2. The spikes then move in under the pressure of the water in the well, till their outer ends clear the walls of the well. The parts B B^1 and D are then free to revolve, while the stem D^1 with its wings *d' d'* are held stationary by the bite of the die A on the drilling-tools, as above stated. As the plunger B^2 continues its upward stroke the pressure of the water in the well also acts through the ports *s s* against the adjacent faces of the piston-wings *d d'*, as illustrated in Fig. 4. The piston-wings *d'* being stationary now, the piston-wings *d* on the barrel D must move in the direction indicated by the arrow in Fig. 4 till they occupy the position shown in Fig. 3, where the devices are all in the same relative position as at the first, and are ready for a new downward stroke. The chamber b^2 is, in this operation, refilled by the water flowing up through the ports *e e'*, and in the next down-stroke the spikes *g* again engage the walls of the well, and the water which, at the up-stroke, entered through the ports *s s*, is ejected at the same ports. At each down-stroke the die A is driven around about one-third of a revolution. A few strokes of the plunger will thus suffice for cutting a screw-thread on the upper projecting end of the drilling-tools; and after a secure joint has thus been made the tools can be hoisted out, if they are not too tightly wedged in, or can be unscrewed, the upper section hoisted out, a new thread cut on the next piece, and so on, till the well is clear.

It will be observed that by the rotation of the stem D^2 two effects are produced: First, the die A is caused to cut a thread on and engage the tools in the well; and second, such tools are unscrewed, so as to permit of their removal with greater facility. For the purposes of the latter function any known form or construction of grab or grapple ordinarily used for such purpose may be substituted for the die A, and thereby enter into combination with the rotating piston. And it will also be observed that the stem, after taking a bite on the tools, is thereby held stationary while the

pump-barrel is rotated back for a new stroke. The means for doing the latter, in this connection, is not material. Nor is the location of the force-pump, up or down, of vital importance, except as to convenience in use and cheapness of construction. Also the devices for holding the pump-barrel stationary while the piston is rotating may be varied somewhat without departing from the scope of our invention.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In an oil-tool extractor the rotating piston-stem of a hydraulic pump, in combination with a die or grapple affixed thereto, so as to be operated thereby in unscrewing the joints of the tools, substantially as set forth.

2. As a means for making connection with the tools in the well, the combination of the rotating piston-stem D^2 and a threaded screw-die, A, affixed thereto, substantially as set forth.

3. The rotating piston-stem D^2 with one or more wings, d', in combination with the barrel D, with a corresponding number of wings, d, relatively arranged and operative under fluid pressure, substantially as set forth.

4. A port or ports leading from the pumping-chamber b^2, and entering the piston-chamber between two piston-wings, one of which wings shall be on a stem, and the other on the barrel, and one of which is capable of a rotary movement under the pressure so imparted, substantially as set forth.

5. In combination with the port or ports e', entering the piston-chamber between two adjacent faces of the piston-wings, the port or ports s entering the same chamber between the other two or opposite faces of the same wings, substantially as set forth.

6. A series of spikes or projections of any known form forced outwardly against the walls of the well by water-pressure, substantially as set forth.

7. A series of spikes or projections capable of being forced out intermittently against the walls of the well, in combination with a hydraulic apparatus arranged to rotate a screw-cutting die or grapple, while the pump itself is, by means of the spikes or projections, secured against rotating, substantially as set forth.

8. The combination of pump, spikes, or projections, and rotating piston-case D, whereby, with the upward stroke of the plunger, the spikes will lose their hold on the walls of the well, and the pump and piston-case be free to rotate back, while the die A or grapple retains its hold on the tool or part of a tool below, substantially as set forth.

In testimony whereof we, the said SAMUEL BUCKLEY and PERLEY H. LAWRENCE, have hereunto set our hands.

SAMUEL BUCKLEY.
PERLEY H. LAWRENCE.

Witnesses:
J. W. MCFARLAND,
ROBERT BALPH.