T. I. Loregrove,

Rock Drill.

No. 47,601. Patented May 2, 1865.

Fig. 2.

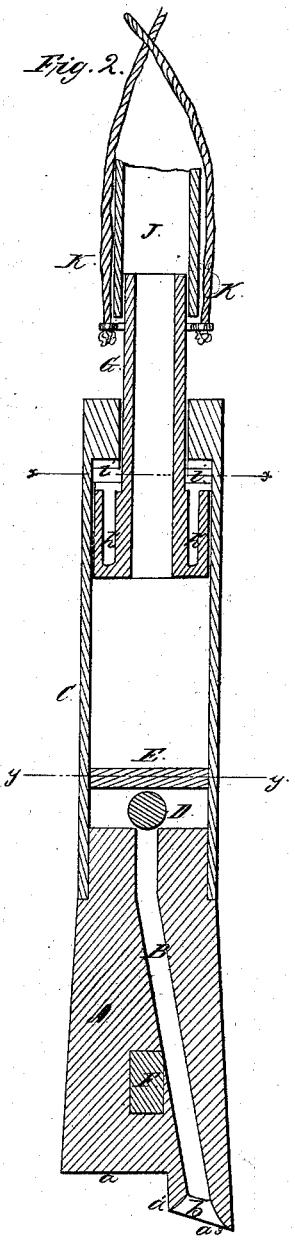


Fig. 3.

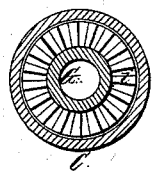


Fig. 4.

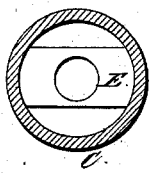


Fig. 5.

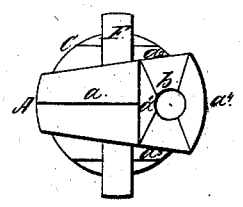
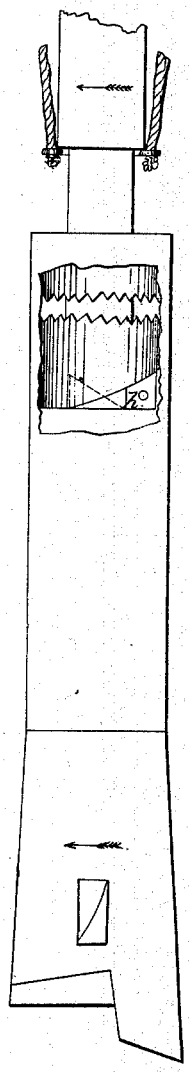


Fig. 1.



Witnesses:
O Rose.
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by his Attys
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UNITED STATES PATENT OFFICE.

THOMAS J. LOVEGROVE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND HENRY BALDWIN, JR.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **47,601.** dated May 2, 1865.

To all whom it may concern:

Be it known that I, THOMAS J. LOVEGROVE, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Tools for Boring Artesian or Oil Wells; of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, in which—

Figure 1 represents a view in elevation of my improved boring apparatus with a portion of the casing broken away to show the interior; Fig. 2, a vertical central section through the same; Fig. 3, a transverse section at the line *x x* of Fig. 2; Fig. 4, a similar section at the line *y y*, and Fig. 5 a view in elevation of the face of the tool.

The objects of my invention are to prevent the jamming or sticking of the boring-tool, to rotate it automatically, and to remove the detritus from the bottom as fast as formed; and to these ends my improvement consists, first, in a drill perforated from its face to its head, in combination with a valve so placed in relation thereto as to be capable of removing the detritus created by its action; second, in a drill having its cutting-edge partly at right angles to its line of vibration, and partly sloped downward from center to circumference, or from heel to toe, at an obtuse angle to its line of vibration, whereby the drill is caused to glance to one side and cut a hole of a diameter larger than that of the drill itself; third, in a drill having two or more cutting-edges on one side and a single cutting-edge in a higher plane on the other, whereby a cone is left in the center of the well by the polygonal cutter, and afterward removed by the single cutter; fourth, in a drill having cutting-edges in different horizontal planes and at right angles to each other; fifth, in combining with a drill having cutting-edges in different horizontal planes wings, flanges, or wedges to rotate the drill; sixth, in combining with a drill turning flanges capable of adjustment so as to project more on one side than on the other.

In the accompanying drawings, which exemplify one mode of carrying out my invention, a hollow or perforated drill, A, is shown as constructed with a single radial cutting-edge, *a*, and one side extending across about two-thirds of the diameter of the drill at a right angle to the line of the vibration, and in this instance with four cutting-edges on the remaining portion of the face of the drill, and in a lower horizontal plane. These edges consist of a horizontal cutting-edge, *a'*, on the inner edge of the lower cutting-surface, at a right angle to the radial line *a*, two diverging straight cutting-edges, a^2 a^3, sloping outward and downward from the line *a'*, and a curved edge, a^4, connecting the edges a^2 a^3. These edges form a chamber or concavity, *b*, in the face of the drill, from which a perforation or channel, B, leads to a jar-chamber, C. A ball-valve, D, prevents the return of any detritus, &c., which has once passed up, and is restrained by a suitable stop or guide, E. Wings, flanges, or guides F are projected from each side of the drill, and are provided with cutting-edges sloped in opposite directions to rotate the drill on the downstroke. By putting a slot through the drill these flanges can be made in one piece and fastened by a wedge or set-screw, so that they may be made to project more on one side than on the other, and thus the projecting edge would aid in throwing the drill to one side to enlarge the bore of the well. A tube, G, works snugly and turns freely in the jar-chamber C, carrying on its lower end a piston, H, having its end sloped in opposite directions, as shown in Fig. 1, so as to form vanes or wings. A channel or annular chamber, *h'*, runs around the piston, into which the water, in passing up through the jar, may enter through openings *h* in the abutments on the downstroke and flow out on the upstroke. The upper end of the piston has ratchet-teeth *i*, taking into a corresponding ratchet, *i'*, on the jar-chamber. A flexible discharge pipe or hose, J, leads from the jar to the place of discharge.

I prefer to vibrate the drill by means of two ropes, K, of wire, one attached to each side of the jar-tube G.

The operation of the apparatus is as follows: As the tool descends, the wings F scrape against the sides of the well and rotate the drill in the direction of the arrow in Fig. 1. The water, detritus, &c., in the well passes up through the channel B into the jar-cham-

ber C. After the drill has struck, the piston H descends in the jar-chamber a distance greater or less, according to the force requisite for the upward blow. During its descent the weight of the piston presses against the water in the jar-chamber, forcing the larger portion up the tube G, while part enters the chamber h' and issues out through the holes or openings h into the space in the jar-chamber above the piston H. On the next (upward) stroke this water above the piston H is forced down through the channels h' and forced out at a tangent through the openings h, and thus turns the piston in a direction opposite to that in which the drill was turned, which in thus turning twists the ropes K. When the upstroke begins, the ratchets i i' lock into each other and prevent the drill and piston from turning independently of each other. As the rising movement continues, the untwisting of the ropes causes the tool to rotate in the direction originally given on the downstroke, and this movement is aided by the discharge of the water from the chamber h', as above described. As the drill rotates, the lower cutting-surface chips out an annular groove around the circumference of the well, leaving a short stem or core in the center, which is removed by the radial cutting-edge a. By this arrangement I cut both in cross and radial lines intersecting each other, and am thus enabled to bore much more rapidly than could be done by the ordinary single-edged cutting-tools.

The details of my invention may be modified in various ways without departing from the spirit of my invention. For instance, the drill might have a plain face, and a channel leading directly from the face through the head.

What I claim herein as new, and desire to secure by Letters Patent, is—

1. A rock-drill perforated from its face to its head, and having cutting-edges around the perforation, in combination with a valve, substantially as described, for the purpose of removing the detritus through the drill.

2. A drill having part of its cutting-surface radial to its center and at a right angle to its line of vibration and the other part sloped downward from heel to toe at an obtuse angle to its line of vibration, substantially in the manner described, for the purpose of cutting a hole of a diameter greater than that of the drill, as set forth.

3. A drill having two or more cutting-surfaces on one side and a single cutting-surface in a higher plane on the other, substantially as described, for the purpose of cutting a core with the polygonal surfaces to be removed by the single cutter.

4. A drill having cutting-edges on different planes, the one horizontal and the other at an obtuse angle thereto, substantially as described.

5. The combination, with a drill having its cutting-edges in different horizontal planes, of the wings or flanges for rotating the drill, substantially as described.

In testimony whereof I have hereunto subscribed my name.

T. J. LOVEGROVE.

Witnesses:

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