T. J. Loregrore,

Walking Beam for Well Drills.

No. 48,343. Patented June 20, 1865.

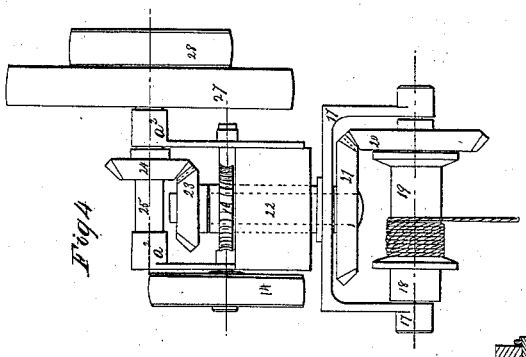

Fig 4

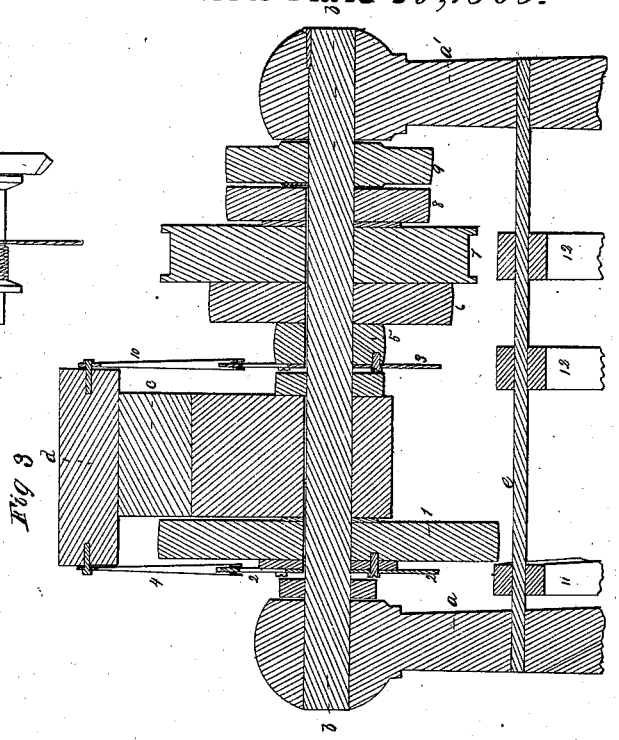

Fig 3

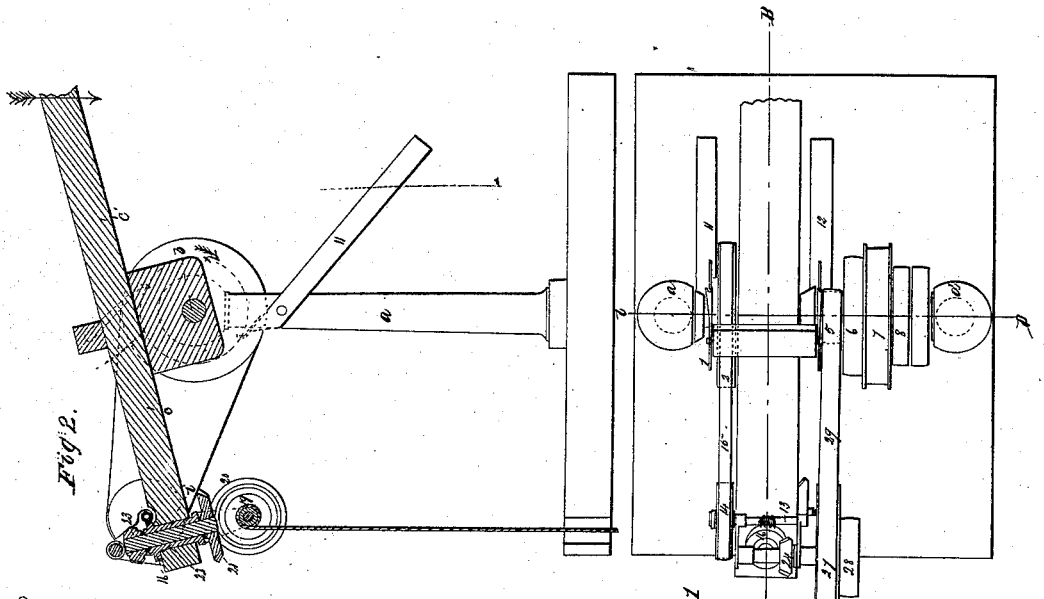

Fig 2.

Fig 1

Witnesses.
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UNITED STATES PATENT OFFICE.

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

MACHINE FOR BORING ARTESIAN WELLS.

Specification forming part of Letters Patent No. **48,343**, dated June 20, 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 Machine 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, and in which—

Figure 1 represents a plan or top view of a machine embracing my invention; Fig. 2, a vertical section through the same at the line A B of Fig. 1; Fig. 3, a similar section at the line C D of Fig. 1; and Fig. 4, a front view of the raising, lowering, rotating, and feeding mechanism.

The objects of my invention are to dispense with the derricks heretofore used in boring oil-wells; to attain greater freedom of access to the mechanism; to raise and lower the drill automatically at any desired rate of speed, and thus to regulate the feed of the drill; to turn the drill automatically while working, and, finally, so to arrange the mechanism that all these movements can be effected and controlled by one person and from one position, so as to avoid the necessity of running from place to place and stopping the work while adjusting some portion of the mechanism; and to these ends my invention consists, first, in so arranging the mechanism which supports, raises, lowers, and rotates the drill, that it shall vibrate directly over the hole; second, in automatically rotating the drill by mechanism actuated by the vibration of the parts which sustain the drill; third, in a mechanism which automatically and simultaneously vibrates, feeds, and rotates the drill; fourth, in connecting one end of a walking-beam or vibrating lever to the motor and the other to the drill by mechanism which gives the drill an intermittent axial rotation; fifth, in combining with a walking-beam or vibrating lever mechanism actuated by the reciprocation of the beam intermittently to rotate the drill, and a mechanism for raising and lowering the drill; sixth, in combining with the vibrating mechanism which supports and rotates the drill a mechanism independent of the vibrating mechanism to raise, lower, or vary the feed of the drill; seventh, in regulating the feed of the drill by the differential movement of the rotating and lowering mechanisms; eighth, in winding the drill-rope on a spool having a motion on both a vertical and a horizontal axis, as well as a vertical reciprocation; ninth, in making the cross-shaft that supports the walking-beam the axis around which the mechanism for operating the drill vibrates.

In the accompanying drawings, which exemplify one convenient mode of carrying out the objects of my invention, the mechanism is shown as mounted on a walking-beam or vibrating lever, *c*, oscillating on a cross-shaft, *b*, secured in a stout frame, *a*, consisting in this instance simply of two posts, *a a'*. Mounted and turning upon the cross-shaft are a number of ratchets and pulleys—viz., on one side of the beam a pulley, 1, for rotating the drill, having a ratchet-wheel, 2, secured to and turning with it, and on the other side of the beam, and next to it, a ratchet-wheel, 3, attached to speed-pulleys 5 6, a brake or friction pulley, 7, and a fast pulley, 8, all turning on the same collar.

All the above-mentioned pulleys and ratchet-wheels rotate freely on the cross-shaft *b* when the ratchet-wheels 2 and 3 are not engaged with their respective pawls. The loose pulley 9 rotates freely at all times. Pawls 4 and 10, pivoted in this instance upon a block, *d*, on the walking-beam, respectively engage the ratchet-wheels 2 and 3, and when the walking-beam is vibrated impart an intermittent rotary motion to the pulleys 1, 5, 6, 7, and 8 in the direction indicated by the arrow *x* in Fig. 2.

Two levers, 11 and 12, are mounted on a rod, *e*, beneath the cross-shaft, so as to slide and turn freely thereon, and carry detent-pawls on their upper ends, which respectively engage the ratchet-wheels 2 3 and prevent their reverse movement. The lever 12 also serves as a brake to the pulley 7 when lowering the drill, to prevent its too rapid descent into the well.

The rear of the walking-beam *c* is attached by a suitable connection to the motor to impart a reciprocating motion to the beam, the front end of which carries the mechanism by which the drill is supported in the bore, and rotated axially to cut the bore on all sides alike. This axial rotation is imparted to the drill by

a worm, 13, rotated through the pulley 14, to which it is fastened, and which receives motion from a belt, 15, connecting it with pulley 1, fastened to the ratchet-wheel 2, which is rotated by the vibrating pawl 4, operated by the vibrations of the beam. The worm 13, secured in proper bearings on top of the beam, gears into a worm-wheel, 16, on the tubular collar *i* of the spool-clevis 17, which carries the spindle 18, that supports the spool 19, on which the drill rope or chain is wound.

The spool-clevis 17 rotates near the under side of the beam, and is securely fastened to the lower portion of the tubular collar, and is of sufficient capacity to receive the spool 19, with all the rope or chain required for any depth of boring, besides two miter-wheels, 20 and 21, the former fast on the spindle 18, with the spool, so that both the spindle 18 and the spool 19 are revolved by and rotate with the gear-wheel 20, which receives its rotation from the miter-gear 21, situated within the spool-clevis 17, being secured to and supported by a short shaft, 22, passing through the collar *i*, and sustained and rotated therein by a miter-gear, 23, on the top of the shaft and over the worm-wheel 13. This miter-gear 23 receives its motion of rotation from a miter-gear, 24, on a short shaft, 25, that is suspended in suitable bearings, a^2, attached to the sides of the beam *c*, and carrying on one end the speed-pulleys 27 and 28, to match the speed-pulleys 5 and 6 on the cross-shaft *a*, which are, in turn, rotated either by the vibrations of the beam, through the connecting-belt 29 and through the vibrating pawl 10 and ratchet-wheel 3, or by the belt from an independent motor which works on and rotates the fast pulley 7 on the axle.

It is obvious that by changing the relative sizes of the various pulleys the speed at which the drill is rotated can be varied, as well as that with which it is raised or lowered in the well, and the same result could be produced by the use of cone-pulleys by shifting the belt along them in the usual well-known way.

The operation of the mechanism is as follows: The pawl 4 and the detent-lever 11 being engaged with the ratchet-wheel 2, as the beam is vibrated up and down on its axis the pawl 4 imparts an intermittent rotation to the pulley 1, which, through its belt 15, pulley 14, worm 13, and worm-wheel 16, transmits a similar movement to the spool-clevis carrying the drill-rope. The pawl 10 and detent 12 being out of gear, the raising and lowering mechanism is inoperative; but as the spool-clevis is rotated by the worm-wheel 16 the miter-wheel 20 traverses around the corresponding one, 21, which turns the spool 19 and unwinds the rope. It will thus be seen that both the rotating and feeding movements of the drill are automatically regulated by the vibrations of the walking-beam.

If the spool should turn so rapidly as to slacken the rope, the pawl 10 and detent 12 may be thrown into gear with the ratchet-wheel 3. The vibration of the beam will then impart an intermittent rotation (through the train of gearing) to the miter-wheel 21, which will revolve the spool-wheel 20 in a direction the reverse of that in which it was turned by the rotation of the spool-clevis. Both motions still continue, but the wheel 21 turns so much more rapidly than the clevis as to wind up the rope faster than it is paid out, in consequence of which the slack would be soon taken up, when the raising apparatus is disconnected and the ordinary feed resumed. It will readily be seen that this differential movement enables me to regulate the feed of the drill with precision.

When simply raising or lowering the drill in the hole, with the walking-beam at rest, I detach the pawls and rotate the pulleys by a band on the fast pulley 8, driven in any suitable manner. When the beam is vibrating the raising can be done, but more slowly, by the intermittent rotation of the wheels 21 and 20, as above described. In this case the axial rotation of the drill is of course unnecessary, and can be discontinued by ungearing the rotating mechanism.

It is obvious that the details of my machine may be modified in various ways without departing from the spirit of my invention. For instance, the mechanism for raising, lowering, feeding, and rotating the drill may be mounted in a frame traversing in guides, like a sawgate or a vertical engine, instead of being mounted on the end of the vibrating beam, in which case its vibrations would be in a plane parallel with the bore of the well, instead of being in the arc of a circle, as herein described. It is likewise manifest that my invention may be applied with good effect to boring wells at a distance from the engine, it being only necessary to conduct the rope over suitable guide-pulleys.

From the foregoing description it will be seen that I dispense entirely with a derrick and arrange the mechanism in a compact form, where it can readily be controlled by the attendant, whose labors are much diminished by the automatic rotation and feeding mechanism.

The machine can be mounted on wheels and readily be transported from place to place.

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

1. Vibrating the mechanism which supports, raises, lowers, feeds, and rotates the drill directly over the hole, so as to dispense with a derrick.

2. Rotating the drill automatically by mechanism actuated by the vibration of the parts which sustain it, substantially in the manner described.

3. A mechanism which automatically and simultaneously vibrates, feeds, and rotates the drill.

4. Connecting one end of a walking-beam or

vibrating lever to the motor and the other to the drill by mechanism which gives the drill an intermittent axial rotation.

5. Combining with a walking-beam or vibrating lever a mechanism actuated by the reciprocation of the beam intermittently to rotate the drill, and a mechanism similarly actuated for raising and lowering and feeding the drill.

6. Combining with a vibrating mechanism which supports and rotates the drill a mechanism independent of the vibrations of the beam to raise or lower the drill.

7. Controlling the feed of the drill by the differential movement of the rotating and lowering mechanisms.

8. A drill-rope spool rotating both on a vertical and a horizontal axis and having a vertical reciprocation.

9. Making the fulcrum of the walking-beam the axis of motion upon which the mechanism is supported for rotating the drill automatically and raising and lowering it, substantially in the manner described, for the purposes set forth.

In testimony whereof I have hereunto subscribed my name.

T. J. LOVEGROVE.

Witnesses:
WM. B. DAYTON,
H. G. OTIS, Jr.