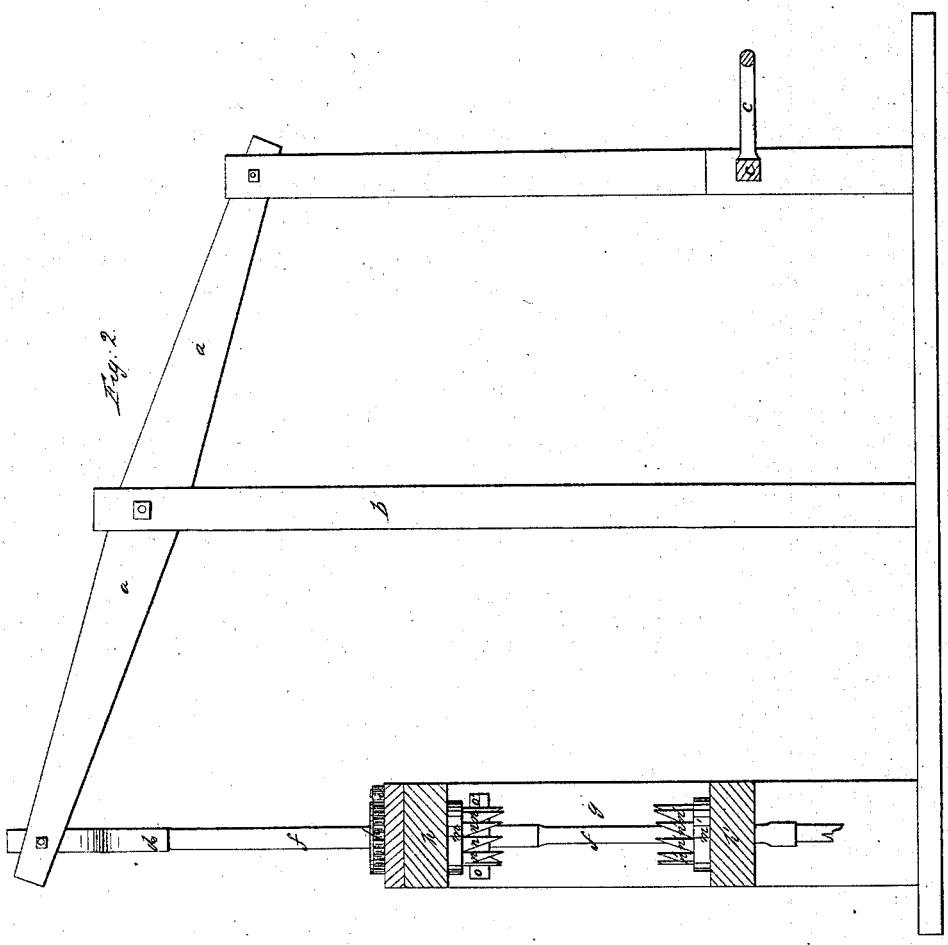
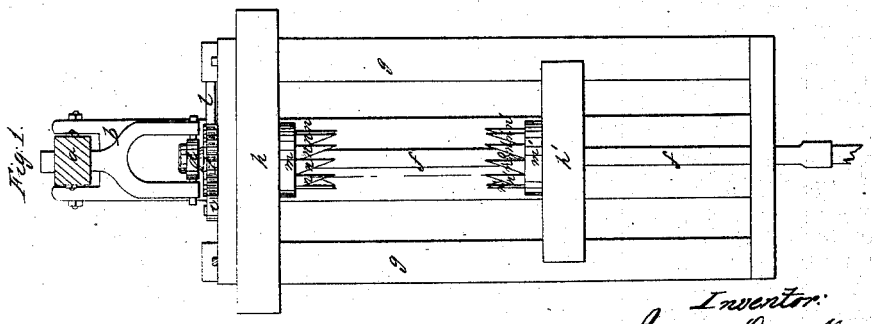
J. Donnell,

Boring Artesian Wells.

No. 47,400. Patented Apr. 25, 1865.





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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN DEVICES FOR WELL-BORING.

Specification forming part of Letters Patent No. **47,400**, dated April 25, 1865.

To all whom it may concern:

Be it known that I, JAMES DONNELL, of the city of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a New and Useful Device for Producing Intermittent Rotary Motion; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification.

My invention is designed especially for giving the requisite intermittent rotary motion to the boring-tool used for sinking Artesian wells for oil salt, water, &c., although the peculiar device may be adapted to any kind of machinery in which the reciprocating motion of any part is to be accompanied at each stroke by a partial revolution thereof.

In boring Artesian wells it is important that the boring-tool should be turned partially round on its axis after each stroke, so as to bore a cylindical hole. This turning of the tool is usually done by hand, but it is often very difficult to prevent the tool striking repeatedly on the same spot, as the impression made by the tool on one stroke, if sufficient to make a depression in the rock or other substance through which the bore is being made, is apt to guide the point of the tool to the same spot when the stroke is repeated. This is especially the case in deep wells, owing to the length of the tool, and frequently results in making the bore angular instead of circular.

The object of my invention is to overcome this tendency by causing the tool to turn through a given arc of a circle at each stroke by a mechanical contrivance connected therewith, which operates to turn the tool just as it is completing its downstroke, and prevents its turning back or dropping into the hole or indentation made by the preceding stroke.

In the accompanying drawings, Figure 1 is a front view, and Fig. 2 a side view, of a boring-tool furnished with my improved device for giving the desired intermittent rotary motion.

In the drawings, *a* is a rocking beam supported about midway from either end by a standard, *b*, on which it vibrates. One end of the rocking beam is connected with a crank, *c*, by the turning of which the rocking beam *a* is made to vibrate. To the other end of the beam *a* is attached the socket of the boring-tool in such a manner, as shown at *d*, as that the tool *f* may turn on its axis as it is made to rise and fall by the vibration of the beam *a*. The boring-tool *f* is kept in a vertical position over the hole which is being bored by a suitable frame-work, *g*. On one of the cross-pieces, *h*, of this frame is placed a ratchet-wheel, *k*, against the teeth of which the ratchet *i* is pressed by the spring *l*. That portion of the boring-tool which passes through the ratchet-wheel *k* is squared and moves freely up and down through a rectangular hole in the center of the ratchet-wheel *k*, so that as the tool *f* revolves on its axis it causes the ratchet-wheel also to revolve, the purpose of the ratchet-wheel and ratchet being to prevent the tool from turning in the wrong direction. On the under side of the upper cross-piece, *h*, of the frame *g* is fixed a metallic ring, *m*, with a number of wedged-shaped pointed teeth, *n*, projecting downward from its circumference. These teeth are uniform in shape and size, and are placed with their bases touching each other. One side of each tooth is perpendicular and the other side slopes from the point of the tooth to the base of the next adjoining one. A short distance below the upper cross-piece, *h*, of the frame is a lower cross-piece, *h'*, on the upper side of which is fixed another metallic ring, *m'*, with pointed teeth *n'*, similar in size and in the shape and number of its teeth to the toothed ring *m* on the upper cross-piece. The lower toothed ring, *m'*, is placed vertically under the upper one with its teeth pointing upward, and the boring-tool *f* passes through the cross-pieces *h h'* centrally to the toothed rings *m m'*. The distance between the base of these toothed rings is a little greater than the length of vertical stroke of the boring-tool. From two opposite sides of the boring-tool (midway between the toothed wheels *m m'* when the boring-tool is at half-stroke) project two beveled arms, *o o'*, of similar shape, which is that of a triangular prism, with two acute angles at the upper and lower edges. The base or longest side of these triangular prisms is vertical, and is so placed on the tool that the arms *o o'* (which enter between the teeth of the toothed rings *m m'* as the boring-tool vibrates up and down) present their vertical side toward the vertical side of the teeth and their beveled side to the sloping side of the teeth. The points of the teeth *n n'* are not exactly in the same vertical line,

the points of the teeth in the lower ring, m', being a little in advance of the corresponding points on the upper ring, m, as shown by the vertical dotted red line in Fig. 1.

The operation of the machinery which I have described is as follows: On every upstroke of the boring-tool f the upper angular edge of the beveled arms o and o', on diametrically-opposite sides of the upper ring, m, pass in between two teeth, n n, the beveled edge of each arm pressing against the sloping side of the tooth, and as the beveled arm o passes upward it presses against the sloping side of the tooth in the ring m, which is rigidly attached to the cross-piece h of the frame, and, as the ring m does not turn, the boring-tool is compelled to do so to the extent of the width of the base of one tooth. On the descent of the boring-tool a similar result is accomplished. The under edge of the beveled arms, passing downward, strikes against the sloping face of the teeth n' in the lower ring, m', and, pressing against it, causes a further partial revolution of the boring-tool. Thus at each complete stroke (up and down) of the boring-tool, it is made to turn in an arc of a circle equal to that occupied by two of the teeth in the rings m m', and, as the ratchet-wheel prevents the boring-tool from receding or turning backward, it continues to turn on its axis at each stroke and strikes the bottom of the bore each time at a different point from that which it struck on the preceding stroke.

Although, as before stated, my invention is designed chiefly as an improvement in apparatus for boring Artesian wells, yet I do not desire to confine myself to that application of it, as it may prove useful in many other kinds of machinery.

For the purpose for which my improvement is chiefly intended, that of causing the boring-tool of an Artesian well to turn on its axis at each stroke, it is necessary that the toothed rings m m' should be fixed so as not to revolve on their axis, and that the shaft should be free to turn on its axis as well as to vibrate up and down; but if it were desired for any purpose to cause the toothed rings to revolve on their axis, the reciprocating shaft which carries the beveled arms o o' should be incapable of rotating on its axis.

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

The combination of two toothed rings, the teeth of which have one side parallel and the other side at an angle to the axes of the rings, with the beveled arms o o' of a shaft which has a reciprocating motion between the rings, for the purpose of producing an intermittent rotary motion of the shaft or rings according as one of them is fixed and the other capable of rotation at each stroke of the shaft, the length of the arc of motion at each half-stroke being regulated by the number of teeth in each of the rings, substantially as hereinbefore described.

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

JAMES DONNELL.

In presence of—
W. BAKEWELL,
IRA ROBBINS.