F. JOHNSON.

STONE DRILLING-MACHINE.

No. 191,057. Patented May 22, 1877.

Fig. 1

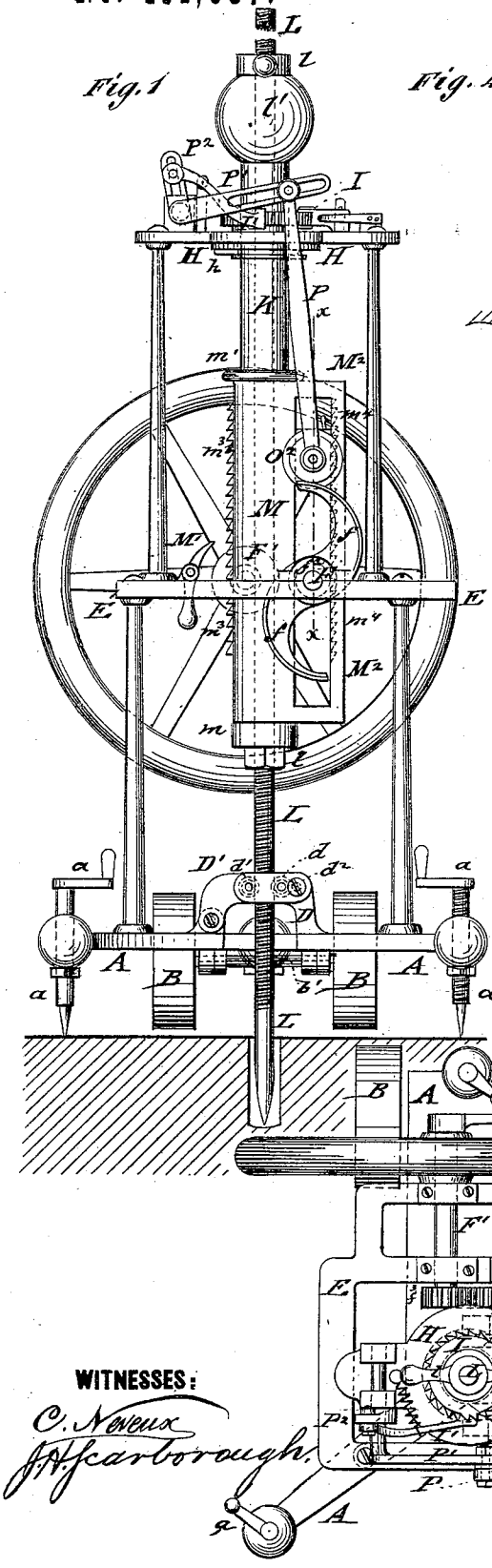


Fig. 4

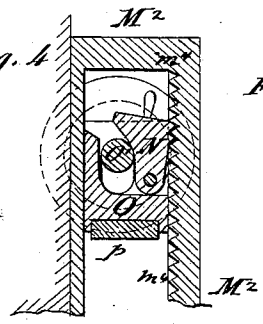


Fig. 2

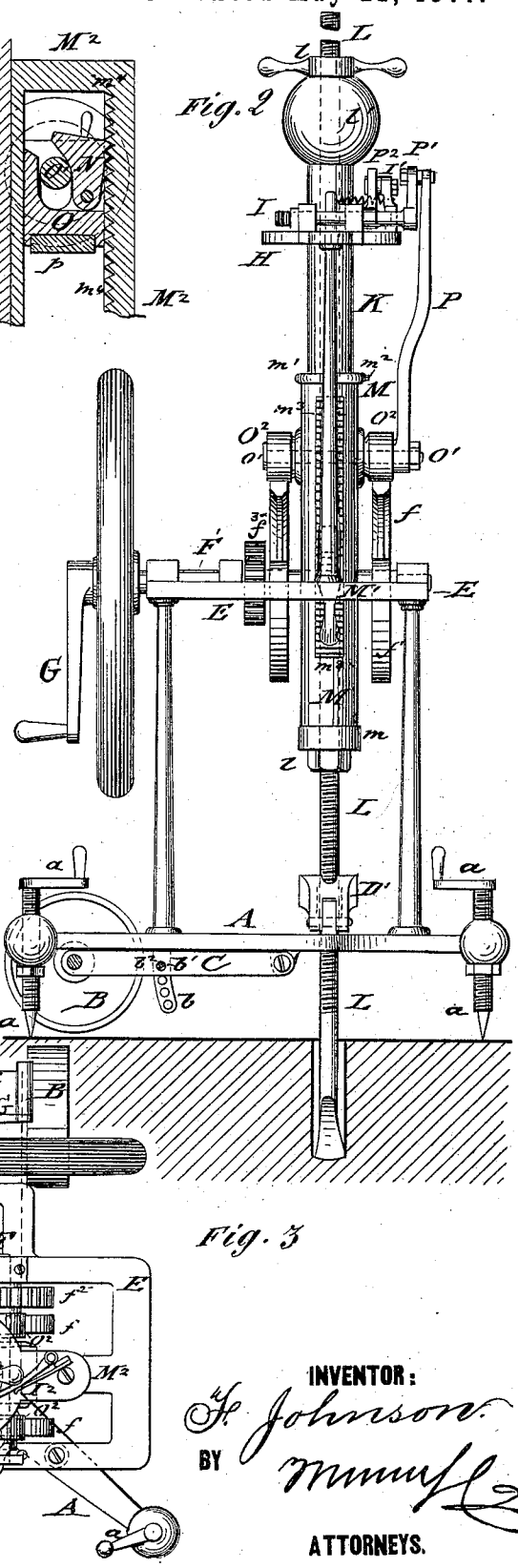
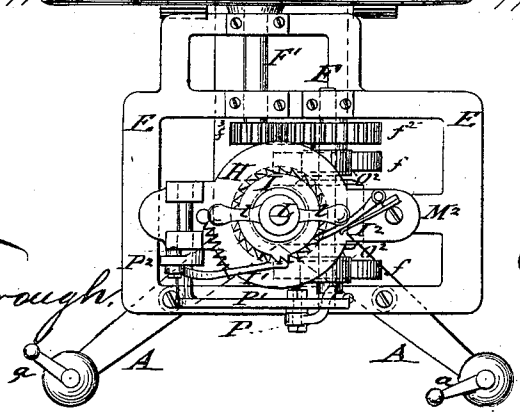


Fig. 3



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FERDINAND JOHNSON, OF TOLEDO, OHIO.

IMPROVEMENT IN STONE-DRILLING MACHINES.

Specification forming part of Letters Patent No. **191,057**, dated May 22, 1877; application filed March 3, 1877.

To all whom it may concern:

Be it known that I, FERDINAND JOHNSON, of Toledo, in the county of Lucas and State of Ohio, have invented a new and Improved Rock-Drill, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a front elevation, Fig. 2 a side elevation, and Fig. 3 a plan view, of my improved rock-drill; and Fig. 4, a detail vertical transverse section on line *x x*, Fig. 1, of the trap-block and ratchet.

Similar letters of reference indicate corresponding parts.

The object of this invention is to construct an improved drill for boring holes in rocks for blasting and other purposes; and the invention consists of a connected cylinder and drill, that are lifted jointly by revolving cams, and rotated at the same time by suitable pawl-and-ratchet mechanism, operated by a pitman-and-pawl-connection with a trap-block, ratchet, and rack of a slotted sleeve, through which the cam-shaft and lifting-roller shaft pass. The drill-shaft is vertically adjustable to any depth, and guided by rollers of the bed-frame, the drill being readily moved from place to place by a truck under the bed-frame.

By reference to the drawing, which fully illustrates my invention, A represents the bed-frame, through which feet *a* pass, arranged with screw-threads, cranks, and jam-nuts, for the purpose of adjusting the frame to any uneven surface, and retaining it in that position.

To this frame A is attached an adjustable pair of truck-wheels, B, by means of arms C, which are adjusted higher or lower below the bed-frame by downward-extending perforated lugs *b* and a cross-pin or bolt, b^1, passing through the holes of the lugs and corresponding holes b^2 of the arms C, so as to lock the truck-wheels close to the bed-frame when set up at the place of work, or lower the same sufficiently below the bed-frame to admit the convenient moving of the entire machine from place to place on the truck.

The bed-frame A carries near its center a fixed bracket, D, with guide-roller *d*, and a pivoted and interlocking bracket, D′, with a second guide-roller, d^1, for the drill-shaft. The bracket D′ is attached to the fixed bracket D by a connecting screw-bolt, d^2, so as to form a latch for guiding the drill-shaft in reliable manner.

On the bed-frame A is supported, on three columns, a second frame, E, to which is hung the shaft F, with its cams *f* and spur-gear f^2.

The shaft F is revolved by a second crank-shaft, F′, with fly-wheel and intermeshing pinion f^3. On the frame E is again supported, on two upright columns, a top plate, H, through which the cylinder K is hung and guided by a ratchet, I, to the lower annular groove of which the adjustable guide-lugs *h* enter.

The ratchet-wheel I is keyed by a tongue into the longitudinal groove of a vertical cylinder, K, that carries the threaded drill-shaft L, and extends to suitable length above and below the ratchet-wheel I.

The cylinder K has at its lower end a collar or flange, *m*, on which rests a sleeve, M, that is further secured in position by a top collar, m^1, and set-screw m^2. The threaded drill-shaft L has at its lower end a drill-bit, and may be adjusted to any depth of bore-hole by top and bottom nuts *l*, that clamp the shaft rigidly to the cylinder in the position required.

On the top of the cylinder K is placed a movable ball, *l′*, of heavy material, that acts as a weight to increase the force of the stroke.

The sleeve M is provided on one side with an outside rack, m^3, into which a weighted pawl, M′, that is pivoted to frame E, may be locked to retain the sleeve and cylinder in position, while the drill-shaft is adjusted to different depths, or for other purposes.

On the other side of the sleeve M is formed a slotted guide-frame, M^2, along which passes the sleeve or roller of the shaft F. The outer side of the slot is also toothed to form a rack, m^4, that works in connection with a pawl, N, of the trap-block O. (See Fig. 4.)

Through an elongated hole of the drop-block O passes a shaft or bolt, O^1, which acts on the inclined surface of the pawl N, and carries at the ends outside of the guide-frame M^2 rollers O^2, that are worked in connection with the cams on shaft F. The space between the trap-block O and the rollers O^2 is filled by washers, which retain the block in position in the slotted frame. On the under side of the

drop-block is a mortise, in which a rubber block, *p*, is inserted, that serves to lighten the stroke of the block as it falls on the roller of the shaft F.

The shaft or bolt O^1, which passes through the trap-block O, bears against the inclined inner surface of the pawl N, and forces the same into the inner rack of the guide-frame M^2 as soon as the cams act on the rollers of the shaft, thus causing the cams to lift the cylinder and drill.

To the end of the shaft O^1 of the trap-block O is connected a pitman, P, which is pivoted to a slotted rock-shaft, P^1, that works by a second slotted arm, P^2, a pivoted spring-pawl I^1, that engages the ratchet I of the cylinder K with every lifting of the same by the cams, and turns thereby the drill-shaft after each stroke. The degree of turning motion is regulated by adjusting the spring-pawl I^1 in the slotted arm P^2, and the pitman in the arm P^1. A check-pawl, I^2, prevents the turning of the cylinder and drill in opposite directions. The rack m^4 of the slotted guide-frame M^2 admits the adjustment of the pawl and trap-block to the degree of axially-turning motion of the drill-shaft.

The operation of the machine is performed by revolving the crank-shaft F′, which turns, by the intermeshing gear, the cam-shaft F, and raises and drops alternately the cylinder and drill-shaft. The pitman-connection of the trap-block with the rock-shaft operates the pawl and ratchet, and revolves thereby the cylinder and drill before each dropping. As the cams lift the cylinder, the ratchet turns the same, and when the cylinder drops the pawl is carried around the ratchet, to engage it again at the next lifting motion, producing thus the revolving of the drill once around, in connection with ten, twenty, or forty strokes, according to the adjustment of the pitman and pawl in the slots of the rock-shaft.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the bed-frame A, supported on adjustable feet *a*, and having perforated lugs *b*, with an adjustable truck-frame, B C, and locking cross pin b^1, substantially as and for the purpose specified.

2. The combination of the guide-latch D D′ of the bed-frame, formed of a fixed and an opening bracket, having guide-rollers *d* d^1, with the drill-shaft L, to guide the same and admit of its being taken out, substantially as shown and described.

3. The combination of the drill-shaft L, inclosing cylinder K, and sleeve M, with adjustable lifting and axially-revolving mechanism, substantially as and for the purpose set forth.

4. The sleeve M, having slotted guide-frame M^2, with inner rack m^4, in combination with the trap-block O, lateral shaft O^1, having rollers O^2, swinging ratchet N, and with revolving cams *f*, to lock sleeve M for lifting the drill-shaft, substantially as specified.

5. The combination of revolving cams *f*, guide-frame M^2, having interior rack m^4, trap-block O, lateral roller-shaft O^1, swinging pawl N, pitman P, and slotted rock-shaft P^1 P^2, with fixed ratchet I of cylinder K, and pawls I^1 I^2, to revolve drill-shaft simultaneously with lifting of the same, and adjust number of strokes for each revolution, substantially in the manner and for the purpose set forth.

6. The trap-block having cushioning bottom block, to prevent concussion in dropping on main shaft F, substantially as described.

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Witnesses:
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