(No Model.) 3 Sheets—Sheet 1.

J. M. CLARK.

ROCK DRILL.

No. 418,554. Patented Dec. 31, 1889.

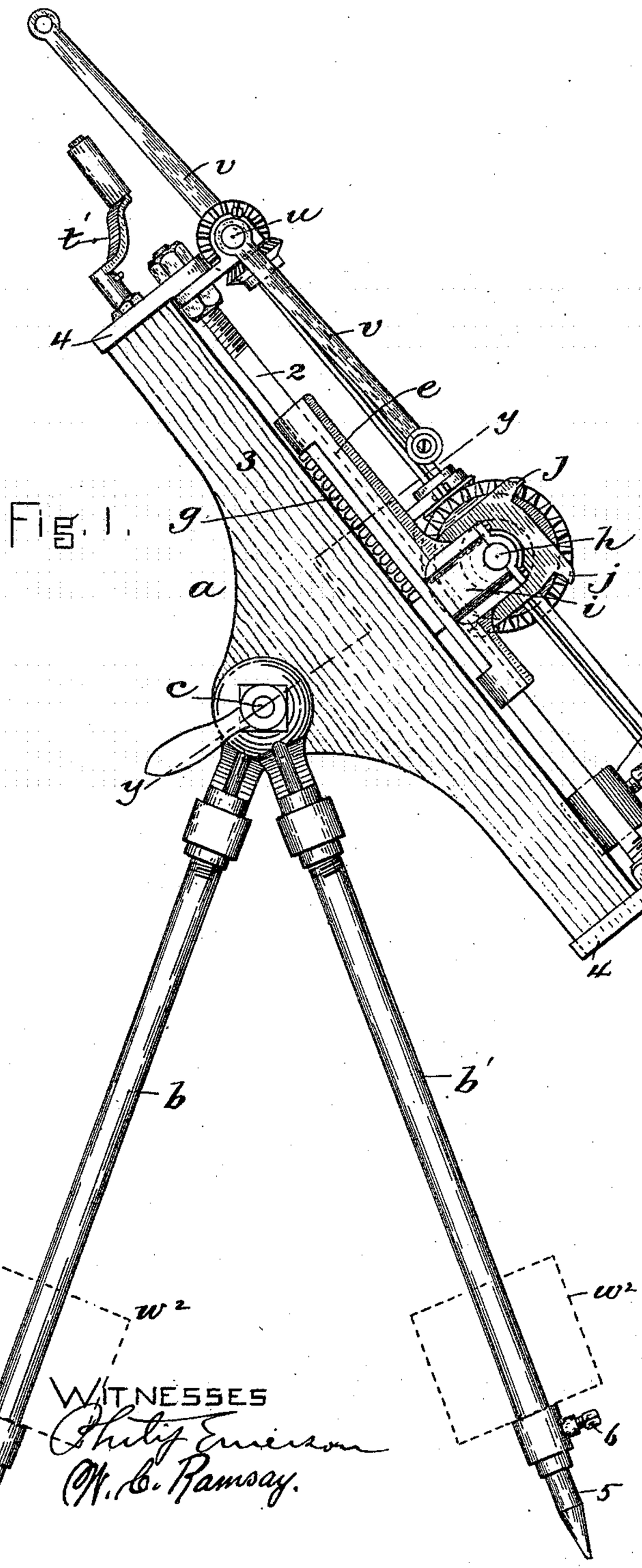

Fig. 1.

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(No Model.)

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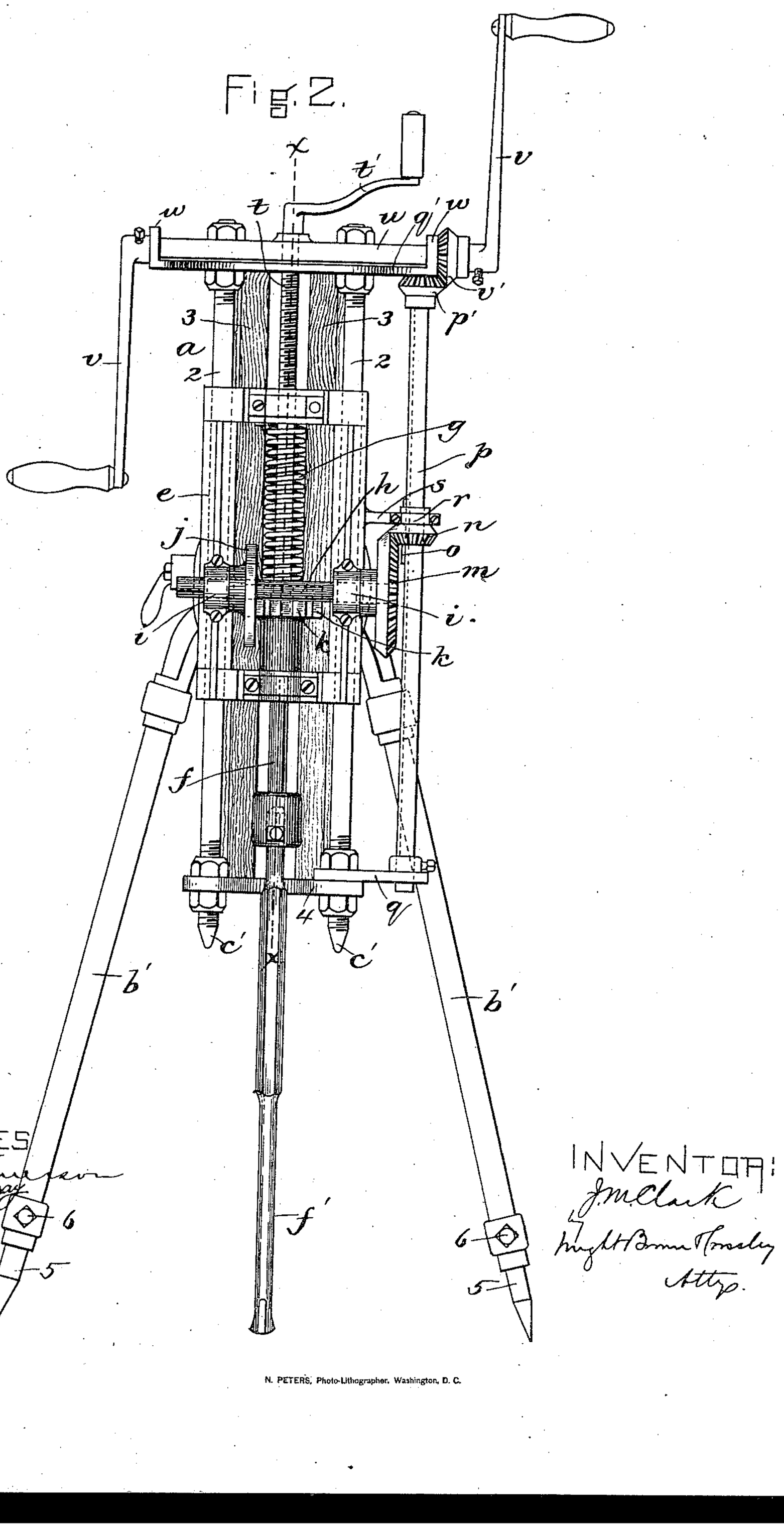
Fig. 2.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 5.

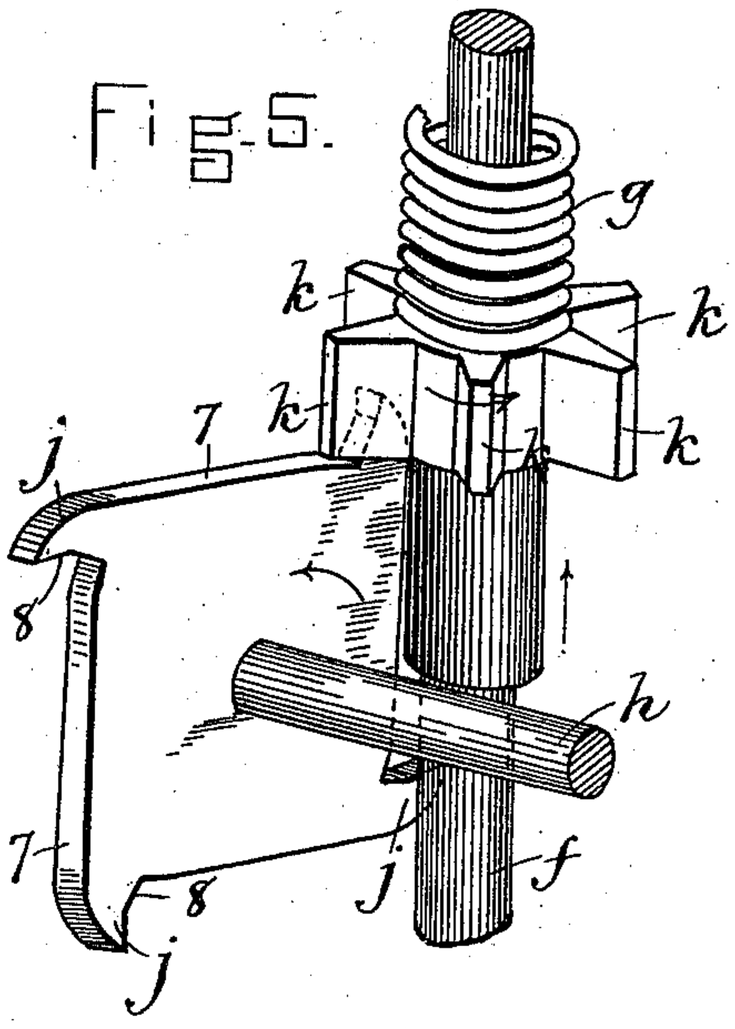


Fig. 3.

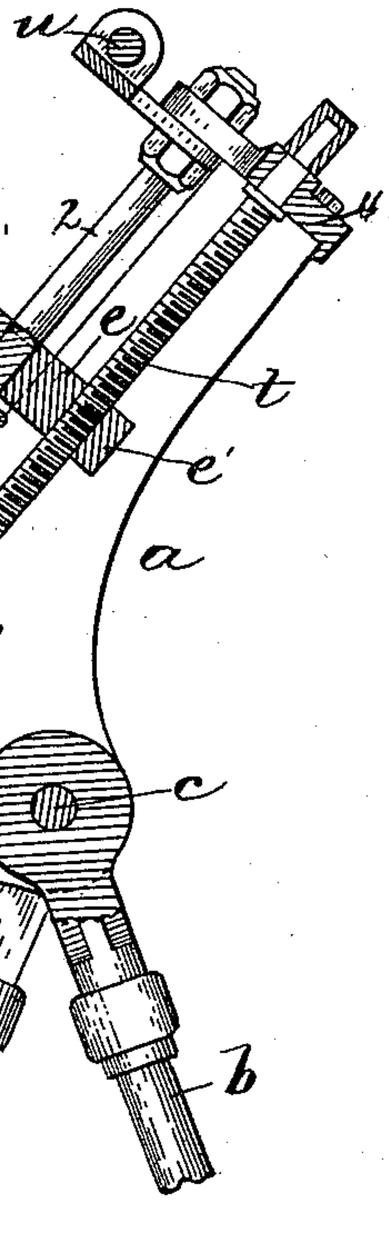
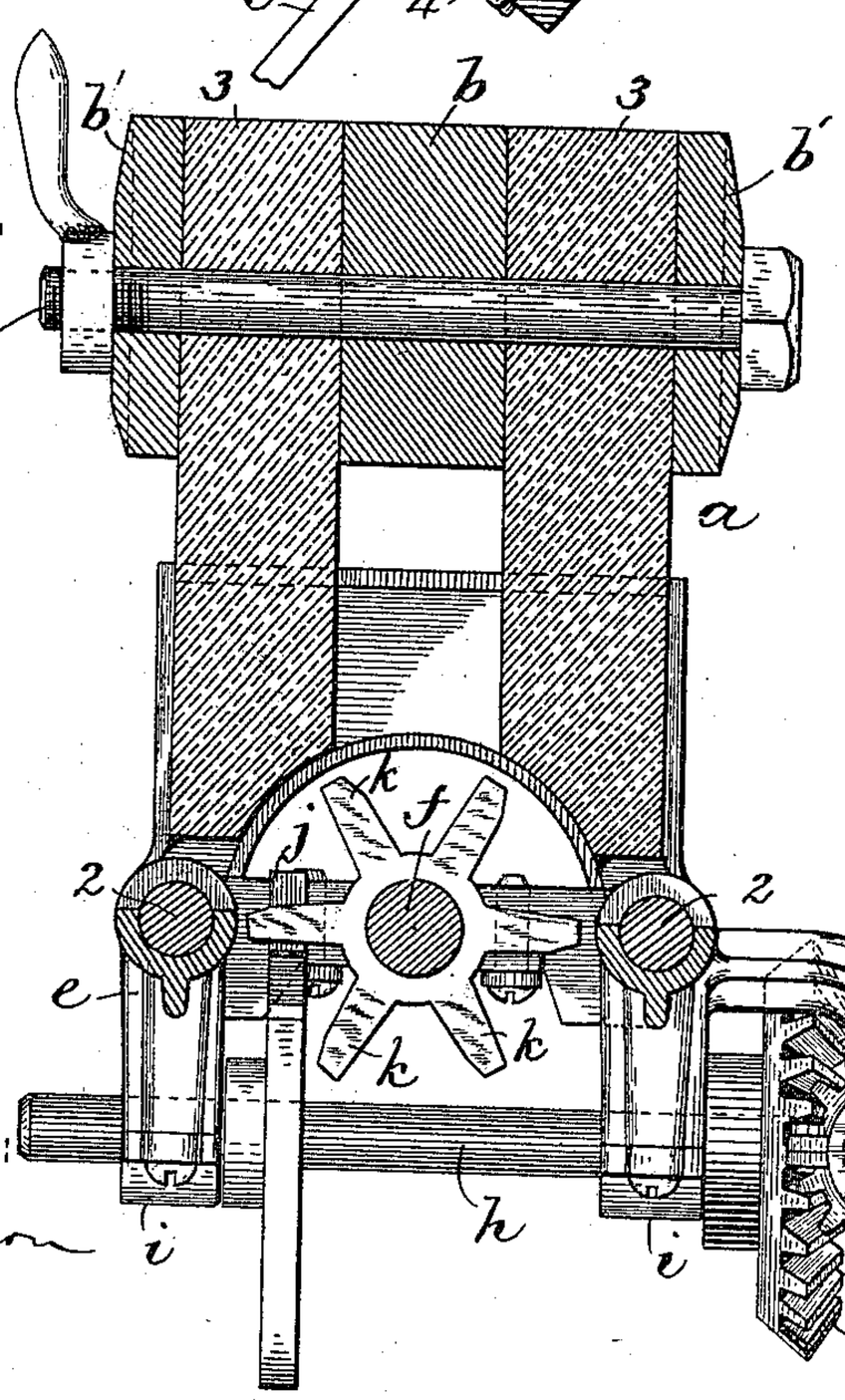


Fig. 4.



WITNESSES:
Philip Emerson
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UNITED STATES PATENT OFFICE.

JAMES M. CLARK, OF MALDEN, MASSACHUSETTS.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 418,554, dated December 31, 1889.

Application filed January 11, 1889. Serial No. 296,052. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. CLARK, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

This invention has for its object to provide a rock-drill of simple construction in which the drill shall be partly rotated while it is being retracted.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of my improved drill. Fig. 2 represents a front elevation of the same. Fig. 3 represents a section on line *x x*, Fig. 2. Fig. 4 represents a section on line *y y*, Fig. 1. Fig. 5 represents a perspective view of the drill raising and rotating devices.

The same letters and figures of reference indicate the same parts in all the figures.

In the drawings, *a* represents the supporting-frame, to which are attached the parallel guide-rods 2 2. The preferred construction of said frame is that here shown, the frame being composed of two longitudinal wooden bars 3 3 and metallic end pieces 4 4, bolted to and connecting the ends of said bars, said end pieces having ears which hold the guide-rods 2 2.

b b' b' represent supporting-legs, each pivotally connected with the frame by a bolt *c*, passing through the central portions of the bars 3 3, one of the legs being between the said bars and the others at the outer sides of the same. The legs are adapted to swing independently on the bolt *c*, and each leg is preferably composed of a tubular body and a pointed tip 5, adapted to slide in said body and secured thereto by a set-screw 6, so that the length and position of each leg may be adjusted to conform to the variations in the surface which supports the apparatus.

e represents a frame fitted to slide on the guide-rods 2 2.

f represents the drill holder or plunger, which is fitted to both slide lengthwise and to rotate in bearings on the sliding frame *e*, and is provided with a powerful spring *g*, whereby it is forcibly depressed to give the drill *f'* its operative blow. Said spring surrounds the drill holder or plunger and its upper end bears on the upper bearing of said plunger, its lower end resting on an enlargement or shoulder on said plunger, and for the sake of strength two springs may be employed, one within the other.

h represents a shaft journaled in bearings *i i* on the frame *e*. Said shaft has a series of teeth *j*, each having a longer side 7 and a shorter side 8, the longer side of each tooth extending to the base of the shorter side of the next tooth, as shown in Fig. 5, so the drill holder or plunger is afforded a collar having a series of radial wings or teeth *k*, arranged like gear-teeth. Said teeth are arranged so that when the shaft *h* is rotated in the direction indicated by the arrow in Fig. 5 the shorter sides of one of the teeth *j* will engage the lower end of the plunger wings or teeth *k* and raise the plunger by said tooth against the force of the spring *g*, and at the same time exert a lateral pressure on said tooth, whereby the plunger is partly rotated while it is ascending until the rotation of the shaft *h* carries the tooth thereof out of engagement with the plunger-tooth, whereupon the plunger is forced down by its spring, the succeeding plunger-tooth dropping along the longer side of the tooth *j*, which last raised the plunger, and stopping in position to be acted on in the manner already described by the shorter side of the next tooth *j*. It will be seen, therefore, that the rotation of the shaft *h* causes its teeth *j* to engage successively the teeth *k* on the plunger, and thereby lift and partly rotate and then release the plunger. The drill is therefore partly rotated after each blow by the devices employed to raise it. The shaft *h* has a bevel-gear *m* affixed to it at one end, and with said gear meshes another gear *n* on a shaft *p*, which is journaled in ears or brackets *q q'*, affixed to the frame *a*. The gear *n* is adapted to slide on the shaft *p* and is rotatively engaged with said shaft by a key or feather *o* therein, which permits the gear to move up and down on the shaft with the sliding frame *e*. A ring or collar *r*, secured to the sliding frame by a bracket *s* and fitted in a periph-

eral groove on the hub of the gear n, connects said gear with the sliding frame, so that when the said frame is raised or lowered by the adjusting-screw t to vary the height of the drill the gear n will move with said sliding frame, and thus remain in operative engagement with the gear m. A shaft u, having cranks v v, is journaled in ears w w on the bracket q', and is provided with a bevel-gear v', meshing with a like gear p' on the shaft p. Rotation of the shaft u by its cranks causes the rotation of the shaft h and its teeth j, and therefore the operation of the drill, in the manner above set forth.

When it is desired to raise or lower the drill, the operator rotates the adjusting-screw t by means of a crank t' thereon. Said screw is engaged with a tapped socket in an ear e' on the sliding frame e, and is journaled in the end pieces of the supporting-frame, so that its rotation causes the sliding frame to move on the guide-rods 2 2. The pivotal connection of the supporting-frame to the legs by means of the bolt c enables the angle of said frame and of the drill to be varied, as may be desired, so that a hole can be drilled in any desired direction. The lower portion of the supporting-frame is provided with spurs or spuds c' c', which may be the case-hardened and pointed ends of the guide-rods 2 2. The object of said spurs is to enable the supporting-frame to rest directly on a rock being drilled, the legs b b' b' being turned back to constitute only a rear support.

I do not limit myself to the described form of the teeth j, whereby the drill-plunger is raised and rotated, but may adopt any other suitable form of teeth or projections which will successively engage the teeth k on the drill-plunger and simultaneously raise and rotate said plunger.

Other details of the machine may also be varied without departing from the spirit of the invention. Weights w^2 may be detachably applied to the legs b b' b' to steady the apparatus, as shown in dotted lines in Fig. 1.

I claim—

1. In a rock-drill, the combination of the supporting-frame having the parallel guide-rods, the sliding frame mounted on said guide-rods, the drill-holder or plunger mounted in said sliding frame, the coil-spring secured thereto and to said frame, the radial teeth projecting from said holder or plunger, the rotary shaft journaled in bearings on said frame, and the series of teeth secured to said shaft, having each long and short sides, substantially as set forth.

2. The combination, with the supporting-frame, of the series of legs, the bolt securing the upper ends of said legs to said frame, whereby the same are pivotally adjustable, the fixed spurs projecting from said frame, the adjustable sliding frame, the plunger having radial teeth, the rotary shaft, and the series of teeth on said shaft engaging said radial teeth, substantially as set forth.

3. The combination of the supporting-frame, the sliding frame fitted to move on guides on the supporting-frame, means for adjusting said sliding frame upon the supporting-frame, the drill-plunger fitted to reciprocate and rotate in bearings in the adjustable frame and provided with a series of teeth, the shaft h, journaled in bearings on the adjustable frame and provided with teeth j, formed to retract and rotate the plunger by engagement with the teeth thereof, the shaft p, journaled in bearings on the supporting-frame, means for rotating said shaft, the gear n, engaged with the shaft by a key or spline and adapted to slide thereon, said gear meshing with a gear on shaft h, and an arm or bracket secured to the adjustable frame and engaged with the gear n, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 1st day of January, A. D. 1889.

JAMES M. CLARK.

Witnesses:
C. F. BROWN,
W. C. RAMSAY.