3 Sheets Sheet 1

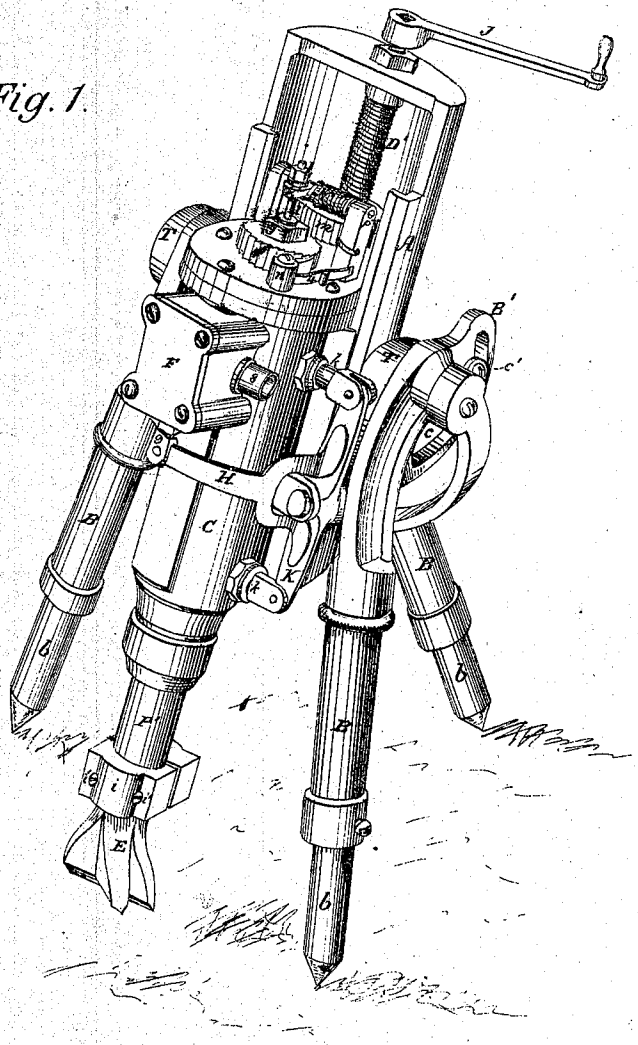
Simon Ingersoll.

Improvement in Drills.

112254

PATENTED FEB 28 1871

Fig. 1.



Witnesses:

Fred. Artos

Herm. Lauten

Inventor:

Simon Ingersoll

by his Attorneys

A. H. & R. K. Evans

Fig. 3.

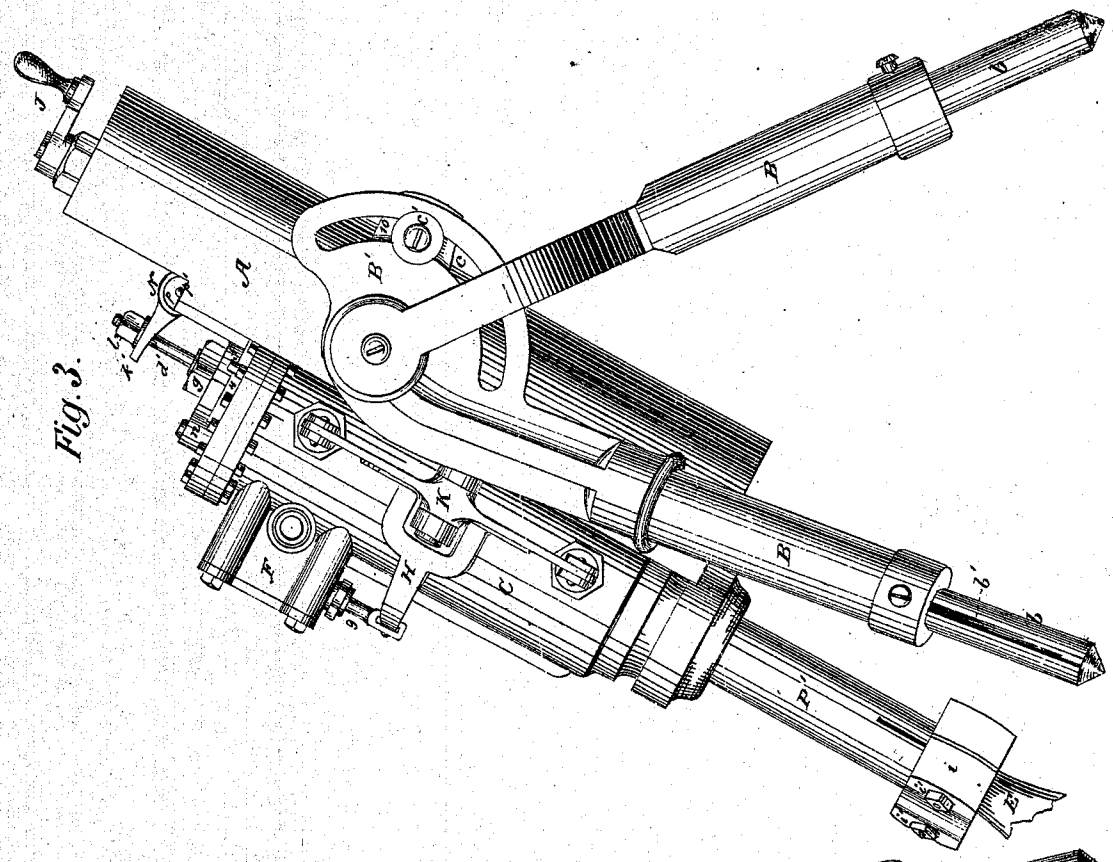
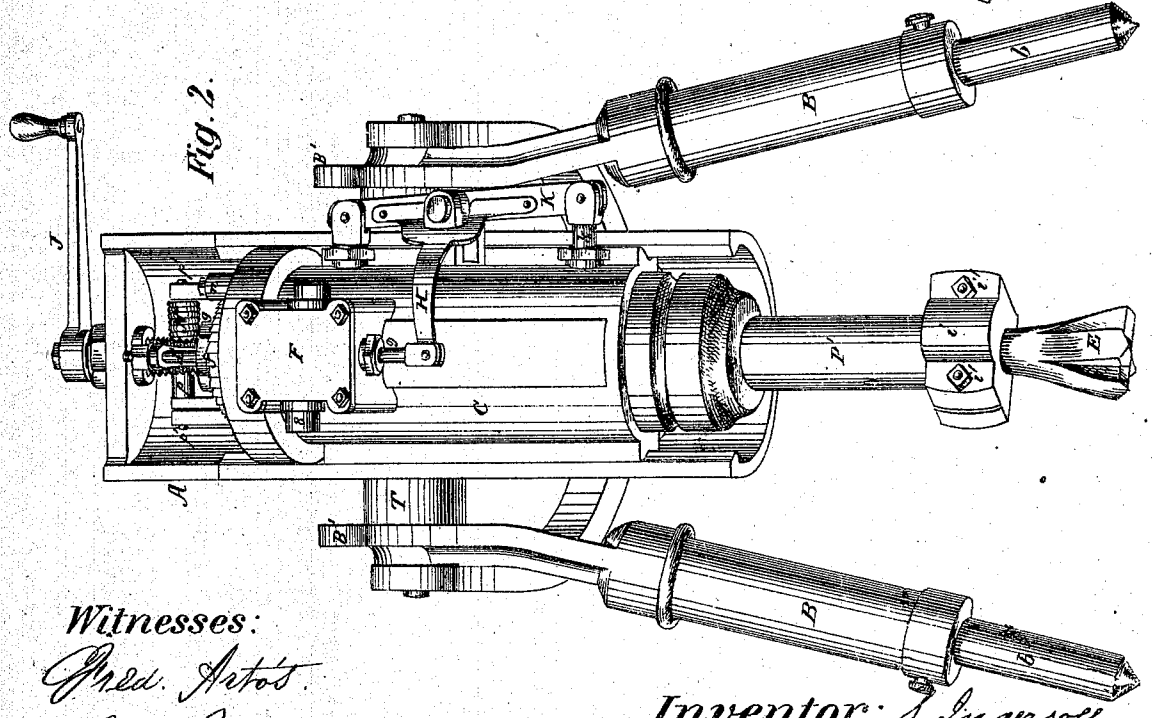


Fig. 2.



Witnesses:
Fred. Artois.
Herm. Lauten.

Inventor: S. Ingersoll
by his attys A.H. & R.K. Evans

Fig. 7.

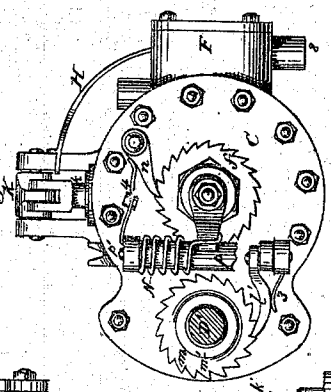


Fig. 10.

Fig. 11.

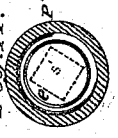


Fig. 9.

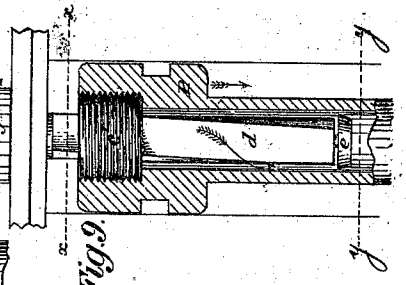


Fig. 6.

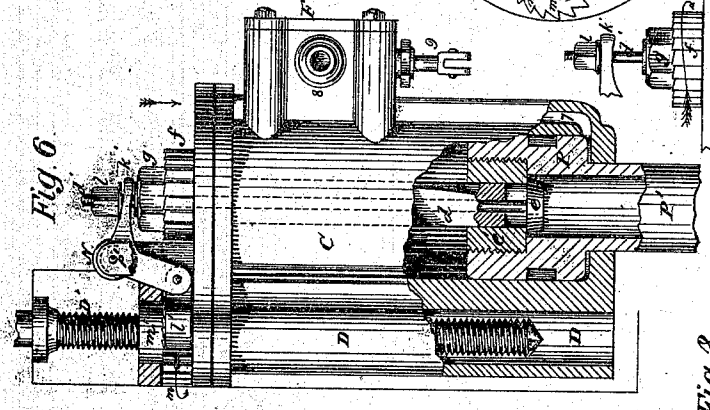


Fig. 8.

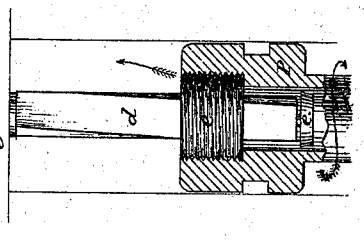


Fig. 5.

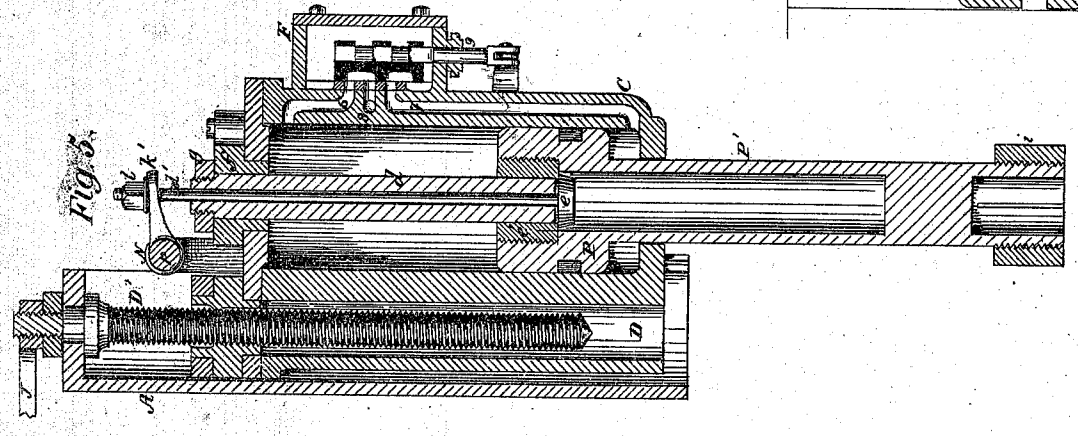
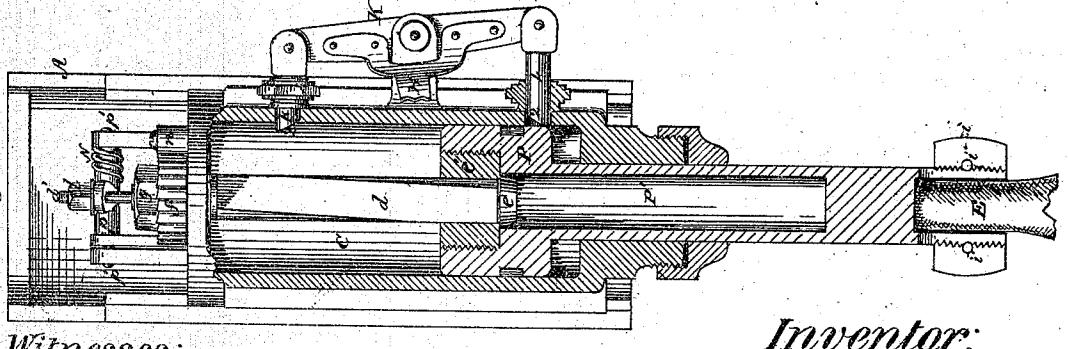


Fig. 4.



Witnesses:
Fred. Artos
Herm. Sautter.

Inventor:
Simon Ingersoll
by his atty's A. H. & R. K. Evans

UNITED STATES PATENT OFFICE.

SIMON INGERSOLL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **112,254**, dated February 28, 1871.

To all whom it may concern:

Be it known that I, SIMON INGERSOLL, of the city of Brooklyn and State of New York, have invented a new and useful Improvement in Drills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making a part of this specification, in which—

Figure 1 is a perspective view of the drill. Fig. 2 is a front view. Fig. 3 is a side elevation. Fig. 4 is a vertical section. Fig. 5 is a horizontal section. Fig. 6 is a side view partially broken. Fig. 7 is a top view. Figs. 8 and 9 show positions of the twisted square bar, feed-rod, and plunger. Fig. 10 is a cross-sectional view through the line *x x* of Fig. 9. Fig. 11 is a cross-sectional view through the line *y y* of Fig. 9.

My improvement relates to that class of drills used more particularly for drilling into rock for blasting and mining purposes; and consists, first, in a feed-rod and plunger so arranged as to secure an automatic feed to the drill; second, in an arrangement of mechanism by which the feed-rod communicates motion to a ratchet-wheel nut, which causes the drill automatically to feed down to its work; third, in the construction and arrangement of the tripod supporting the drill-frame.

To enable others to use and understand my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A is the frame which holds the cylinder; B B B, the legs or tripod on which the frame A rests. *b b b* are extensions sliding into the sockets formed in the lower ends of the legs, and secured therein by screws touching on longitudinal inclined grooves *b'* in the sides of the extensions. These grooves inwardly incline as they pass up the sides of the extensions, and hence the screws may be loosened for the purpose of adjusting the legs without danger to the drill or the persons in charge from a sudden slide of the leg B over the extension *b*. The upper portion of the legs B B, on either side of the frame is formed with a plate, B', having a curved slot, *c*, in which slides the adjustable screw, *c'*, attached to the arm 10 extending from the trunnion T of the cylinder-frame A.

By means of this construction I am enabled not only to adjust the legs of the frame independently of each other, and thereby operate my drill upon any desired point, however rough or uneven the surface, but if necessary I can adjust my drill to a horizontal position without disturbing the adjustment of the legs.

C is a cylinder in which works the hollow piston P. In the upper end of the piston is rigidly fitted the nut *e'* with a square opening, *s'*, as shown in Fig. 10. *d* is a square bar nicely fitting into the opening *s'*, Fig. 11, and upon which the piston P slides within the cylinder C. The nut *e'*, being rigidly secured to the head of the piston, causes the piston to follow the direction of the sides of the square bar as the piston passes up. The opposite effect is produced as the stroke of the drill is made, as will be hereafter more fully explained. The square bar *d* has a slight twist, say, about one-eight of a circle, for the purpose of giving a revolving motion to the piston-rod P', which will also be hereafter explained. The upper end of the bar *d* passes through and extends outside of the cylinder-head, but is so rounded at that point that it will revolve snugly within the opening through which it passes. On the same bar, and outside of the cylinder-head, is rigidly secured the ratchet-wheel *f*, by means of the nut *g*. *d'* is a feed-rod, (see Fig. 5,) passing centrally through the nut *g*, ratchet *f*, and bar *d*, and having secured at its lower end the button or plunger *e*. This feed-rod is secured at its upper end to the crank-lever *k'* by the nut *l*. The pawl *n*, (see Fig. 7,) held in position by spring 4, engages with the teeth of the ratchet-wheel *f*, and holds that in position.

It is evident that my feed-rod *d'*, plunger *e*, and piston P will actuate any other suitable feeding device, as well as that which I have specially introduced into my drill.

From this description it is clear that the forward or downward movement of the piston P, sliding over the twisted square rod or bar *d*, will cause the latter to revolve to the right, and with it the ratchet-wheel *f*, which is then caught and held by the pawl *n*, (see Fig. 7,) to prevent an opposite movement of the bar *d* and ratchet-wheel *f* on the return stroke of the piston P. The result is the piston P has to revolve instead of the square twisted bar

d at the return stroke of the piston, thus producing an alternate revolving between the piston and the bar and ratchet wheel *f*. (See Figs. 8 and 9.)

E is a drill fitting into a slotted socket in the lower or outward end of the piston-rod P′, and firmly secured therein by means of a sectional screw-nut, *i*, held together by the screws *i′ i′*. This nut may form a female screw fitting over screw-threads cut upon the end of the piston-rod. This would afford additional security to the drill by holding the nut in position. The slots in the piston-rod allow the metal of the rod to be drawn by the screws *i′ i′* securely and tightly around and against the drill. When the drill is thus rigidly attached to the lower end of the piston-rod, it is manifest that the drill will have the same motion with the rod, and by means of the twisted square bar *d*, as already explained, will have a slight revolving motion which changes the position of the drill on the rock at every stroke of the piston. (See Figs. 8 and 9.) When the drill has cut sufficiently deep to allow the plunger *e* to be forced down, as shown in Fig. 6, the head of the feed-rod *d′* forces down the crank-lever *k′*, which throws forward the pawl *l′*, and engages it with the teeth of the ratchet-wheel nut *m*, and causes it to revolve on the feed-screw D′. This screw being stationary, and the ratchet screw-nut being attached to the cylinder, the drill is carried down to its work and is fed automatically. D is a sleeve covering the screw D′, and holding it steadily in position. A crank, J, (see Fig. 2,) is used for turning the screw D′ when it is desired to raise the drill from the rock. 3 is a spring holding the pawl *l′* against the ratchet-wheel nut *m*, and cap *m′* serves to keep the ratchet-wheel nut *m* in position. N, (see Figs. 4 and 5,) is a spiral spring by which the feed-rod, crank-lever *k′*, and pawl *l′* are held in position against the counteracting force of the piston P. *p* is the crank-shaft with its bearings in *p′ p′*. (See Fig. 4.) K is a tappet-lever, the motions of which are regulated and controlled by beveled tappets operated upon alternately by the piston P. The beveled ends of these tappets pass into the cylinder C just far enough to allow the beveled or inclined edges of the piston to strike alternately against the bevel or incline 2 on the inner ends of the tappets, as shown in Fig. 4. The inclines on the edges of the piston coming in contact with the beveled portion of the tappets, the latter are alternately forced outward, and motion thereby given to the tappet-lever. H is a bent valve-lever attached at one end to the tappet-lever K, and at the other end to the valve-stem 9, as shown in Fig. 2. It is evident that the motion of the tappet-lever will give a lateral motion to the valve-lever H, and cause the valve-stem 9 to slide in the steam-chest F, which is constructed after the usual manner of constructing steam-chests, and in which 6 and 7 are the ports, and 8 is an exhaust-port.

One of the great objects gained by my improvements is the reduction in the length of the machine, and its adaptation to the work of drilling for blasting and mining purposes. It is so compact in form that it may be easily moved by two men and placed in position for work at any desired spot. The weight of a full-sized working drill made with my improvements does not exceed three hundred and sixty pounds.

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

1. The feed-rod *d′* and plunger *e*, in combination with any suitable feeding device, and the piston P, substantially as and for the purpose set forth.

2. The combination of the feed-rod *d′* with the crank-lever *k′*, pawl *l′*, ratchet-wheel nut *m*, and feed-screw D′, all constructed and operated substantially as and for the purpose described.

3. The legs B B B, with their extensions *b b b*, adjusted with screws working into the inclined longitudinal grooves *b′ b′ b′*, substantially as and for the purpose set forth.

SIMON INGERSOLL.

Witnesses:

SAML. C. MILLS,

WM. M. EVANS.