3 Sheets--Sheet 1.

S. INGERSOLL.

Rock-Drills.

No. 147,402. Patented Feb. 10, 1874.

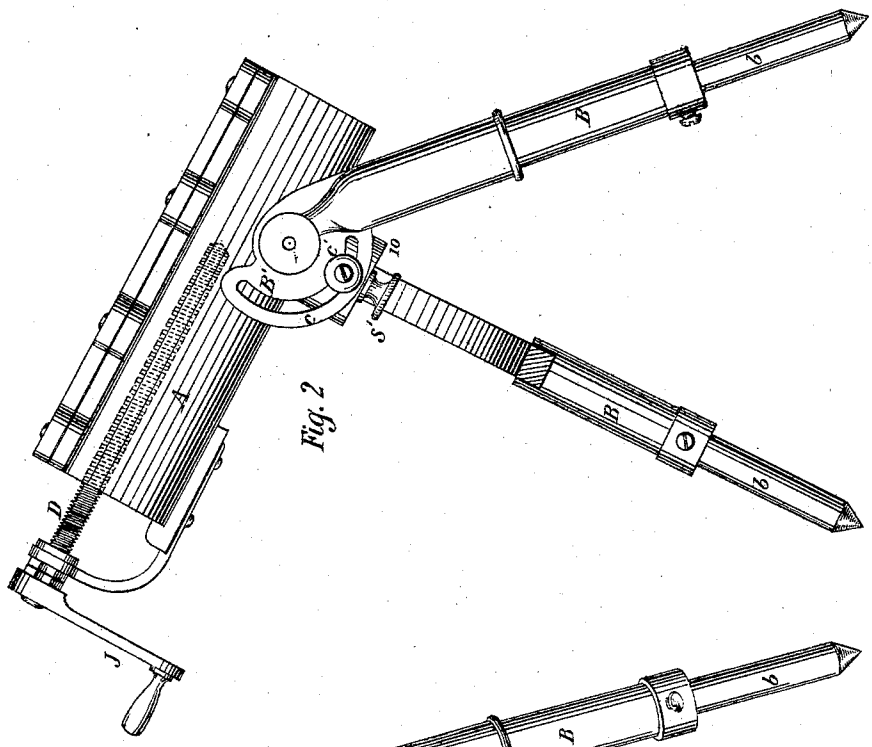


Fig. 2

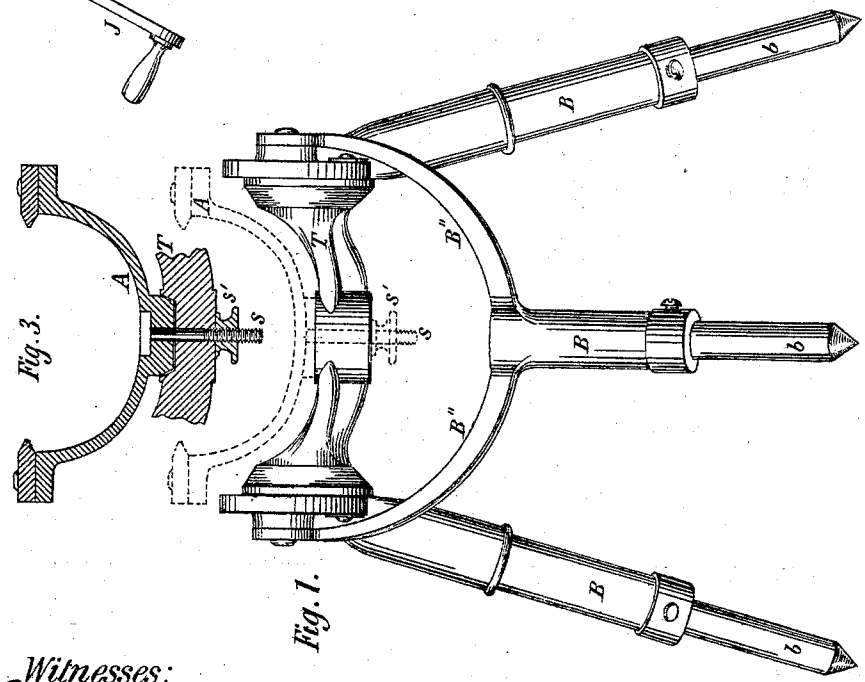


Fig. 1.

Fig. 3.

Witnesses:
Pattedge Wilson
Hm Cormick

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

3 Sheets--Sheet 2.

S. INGERSOLL.

Rock-Drills.

No. 147,402. Patented Feb. 10, 1874.

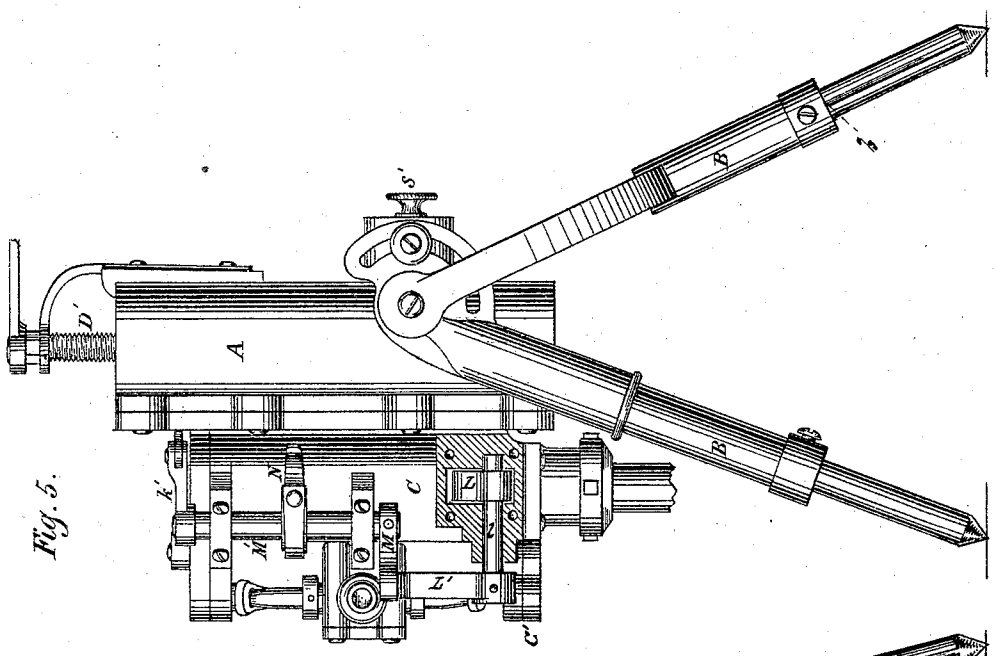


Fig. 5.

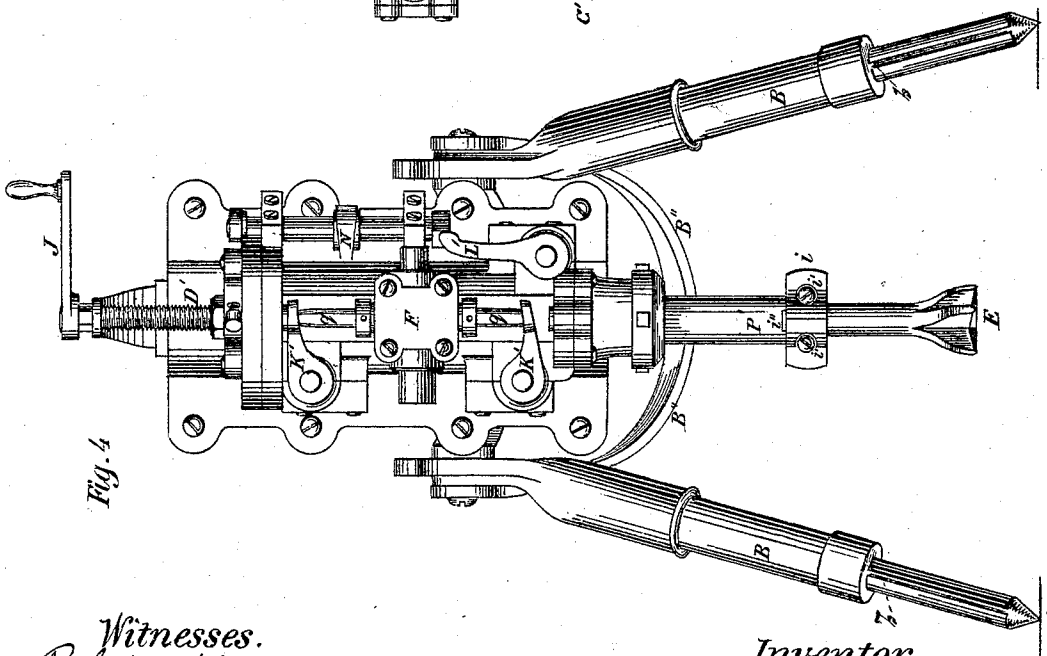


Fig. 4.

Witnesses.

Rudolph Wilson

Wm. McCormick

Inventor.

Simon Ingersoll

by his attys

A.H. & R.K. Evans.

3 Sheets--Sheet 3.

S. INGERSOLL.

Rock-Drills.

No. 147,402. Patented Feb. 10, 1874.

Fig. 10.

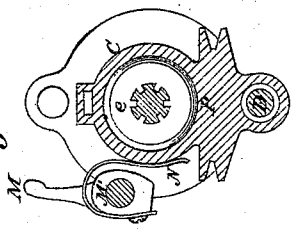


Fig. 11.

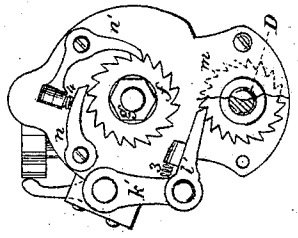


Fig. 7.

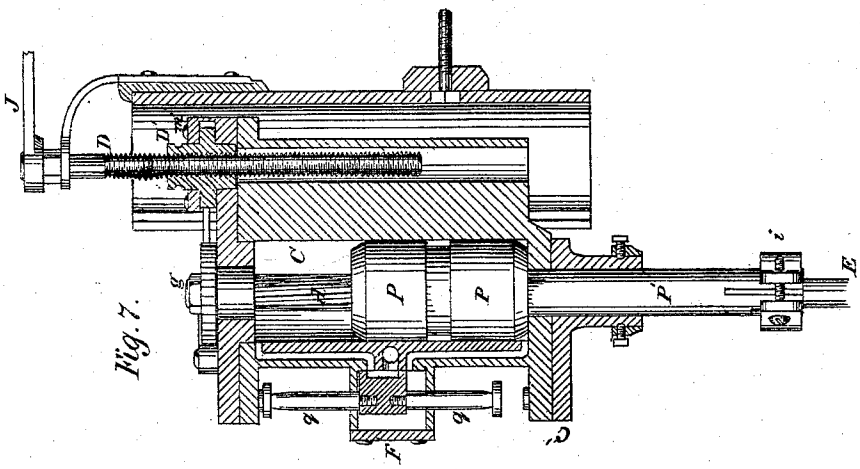


Fig. 8.

Fig. 9.

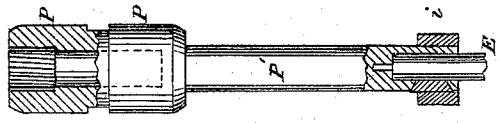


Fig. 12.

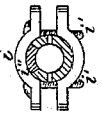
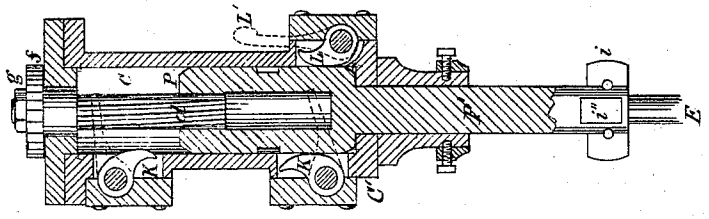


Fig. 6.



Witnesses.
Rutledge Wilson
Hm Cormick

Inventor.
Simon Ingersoll
by his attys.
A. M. & R. K. Evans

UNITED STATES PATENT OFFICE.

SIMON INGERSOLL, OF NEW YORK, N. Y.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **147,402**, dated February 10, 1874; application filed September 16, 1873.

To all whom it may concern:

Be it known that I, SIMON INGERSOLL, of the city of New York and State of New York, have invented certain new and useful Improvements in Rock-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 front view of the tripod on which the drill-frame rests. Fig. 2 is a side elevation, showing the tripod with drill-frame attached. Fig. 3 is a cross section of the drill-frame, showing its connection with the tripod. Fig. 4 is a front view of the drill complete. Fig. 5 is a side elevation of the same. Fig. 6 is a longitudinal section of the steam-cylinder. Fig. 7 is a longitudinal vertical section of the same. Fig. 8 is a cross-section of the rod *d*. Fig. 9 is the piston-rod partially in section. Fig. 10 is a cross-section near the top of the drill. Fig. 11 is a top view of feeding device. Fig. 12 is a cross-section through piston-rod and drill.

My improvement relates to that class of drills used more particularly for drilling rock for blasting and mining purposes, and is an improvement on the rock-drill patented to me February 28, 1871, No. 112,254; and it consists in a device for feeding the drill forward.

To enable others skilled in the art to make and use 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 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 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 grooved opening, as shown in Fig. 10. *d* is a grooved bar nicely fitting into the opening in the nut *e*, as shown in Fig. 8, 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 ribs of the grooved 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 grooves in the bar *d* have a slight twist, say about one-eighth of a revolution for the purpose of giving a rotating motion to the piston-rod P, which will also be hereinafter 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*. From the description it is clear that the forward or downward movement of the piston P sliding over the twisted ribs of the 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. 11,) 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 *d*, and the ratchet-wheel *f*. E is a drill fitting into a 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. D' is a

screw-nut or female screw holding the screw D steadily in place, and, by freely revolving with the ratchet-wheel *m*, causes the drill to be automatically fed forward. 3 is a spring to hold the pawl *l'* against the ratchet-wheel *m*. The crank J is used for turning the screw D when it is desired to raise the drill from the rock. The pawls *n n'* are constructed as shown in Fig. 11, and, by means of the spring 4 placed between them, the pawls are made to engage alternately with the ratchet-wheel *f*. N is a bent spring secured to a rigid block on the bar M', and bearing against the side of the cylinder to cause the arm M to resume its position after being thrown out by the arm L, and consequently to draw back the pawl *l'* after it has pushed forward the ratchet-wheel *m*. When the piston P approaches the lower end of the cylinder it strikes the tappet L, (see Fig. 6,) and throws it outward, at the same time giving a corresponding motion to the arm L', which is rigidly attached thereto by the bar *l*. (See Fig. 5.) The movement of the arm L' is communicated to the arm M, and through the bar M' to the arm *k'*, which works the pawl *l'*, as shown in Figs. 5 and 11. The pawl *l'* engages with the ratchet-wheel *m*, which operates the screw-nut D, which feeds the drill.

It is evident that this feed motion cannot be put in action until necessary, as until it is necessary to feed the drill the piston P will not reach the lower end of the cylinder. And, it is also evident that the moment the necessity exists, from striking soft rock, or a seam in the rock, or from any other cause whatever, the piston strikes the tappet L, and sets the feed motion instantly into action, thus producing a certain and perfectly automatic feed for the drill. By means of the feathers *i''*, (see Figs. 6, 8, and 12,) I am enabled to attach the drill E rigidly to the piston-rod P'. 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 of the rod, and by means of the spiral grooved 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.

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

The tappet L, arm L', arm M, shaft M', arm *k'*, and pawl *l'*, in combination with the ratchet-wheel *m*, screw D, and screw-nut D', and piston P, for the purpose of feeding the drill, substantially as described.

SIMON INGERSOLL.

Witnesses:

HENRY C. SERGEANT,

A. H. ELLIOTT.