(No Model.)

3 Sheets—Sheet 1.

W. WEAVER.

ROCK DRILL.

No. 387,127. Patented July 31, 1888.

Fig. 1.

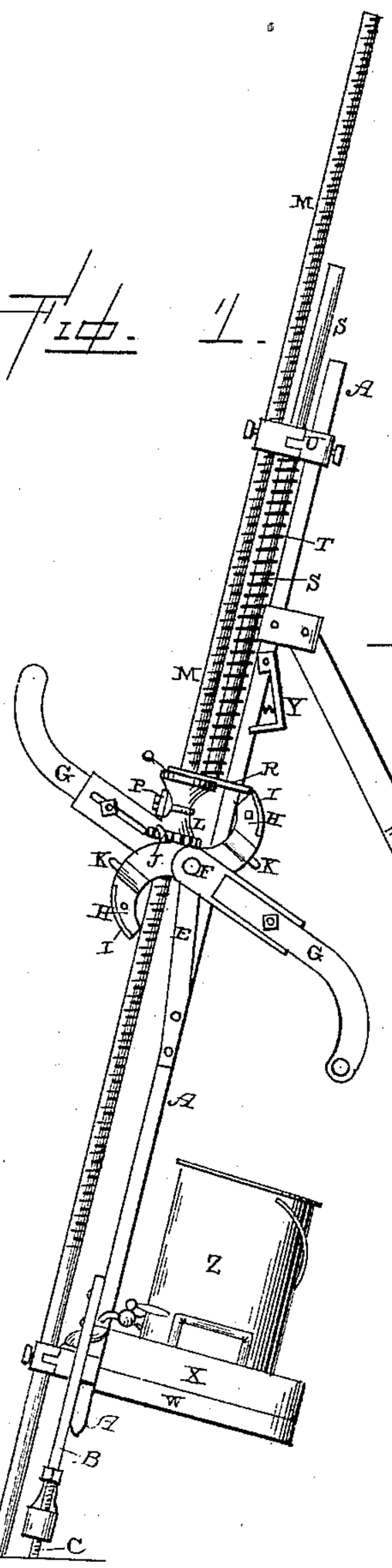


Fig. 3.

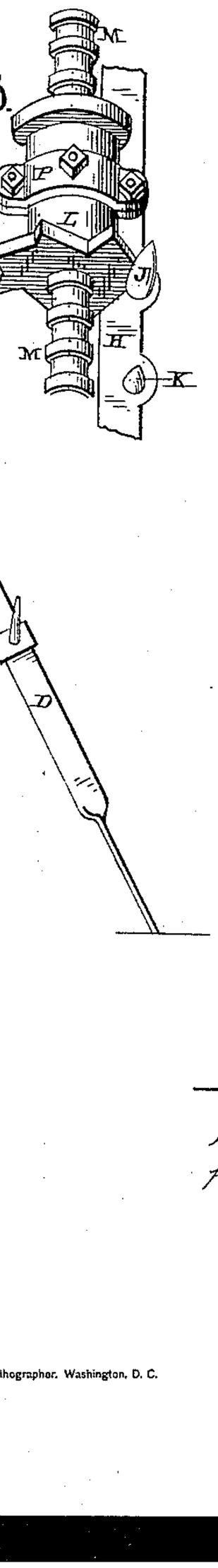
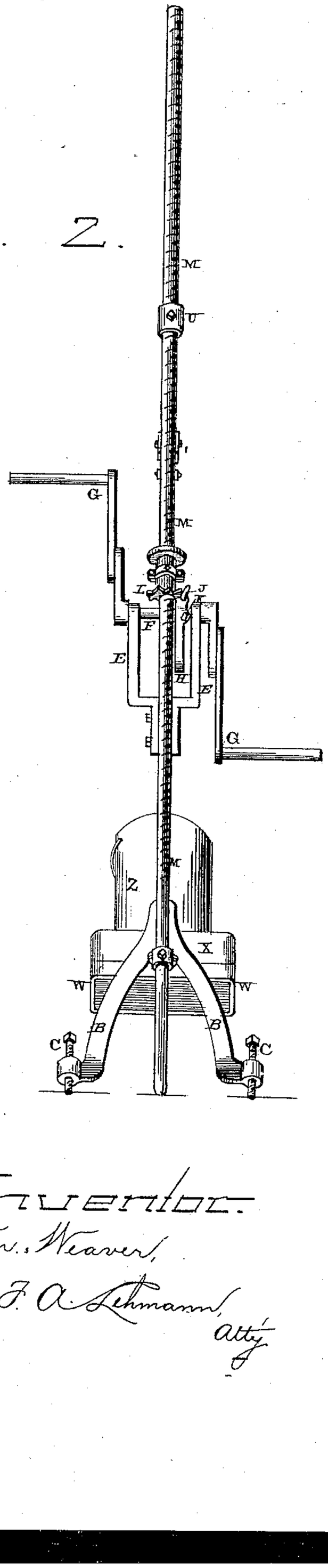


Fig. 2.



Witnesses.

L. F. Gardner.

Edm. P. Ellis

Inventor.

Wm. Weaver,

per F. A. Lehmann,

Atty

(No Model.)

3 Sheets—Sheet 2.

W. WEAVER.

ROCK DRILL.

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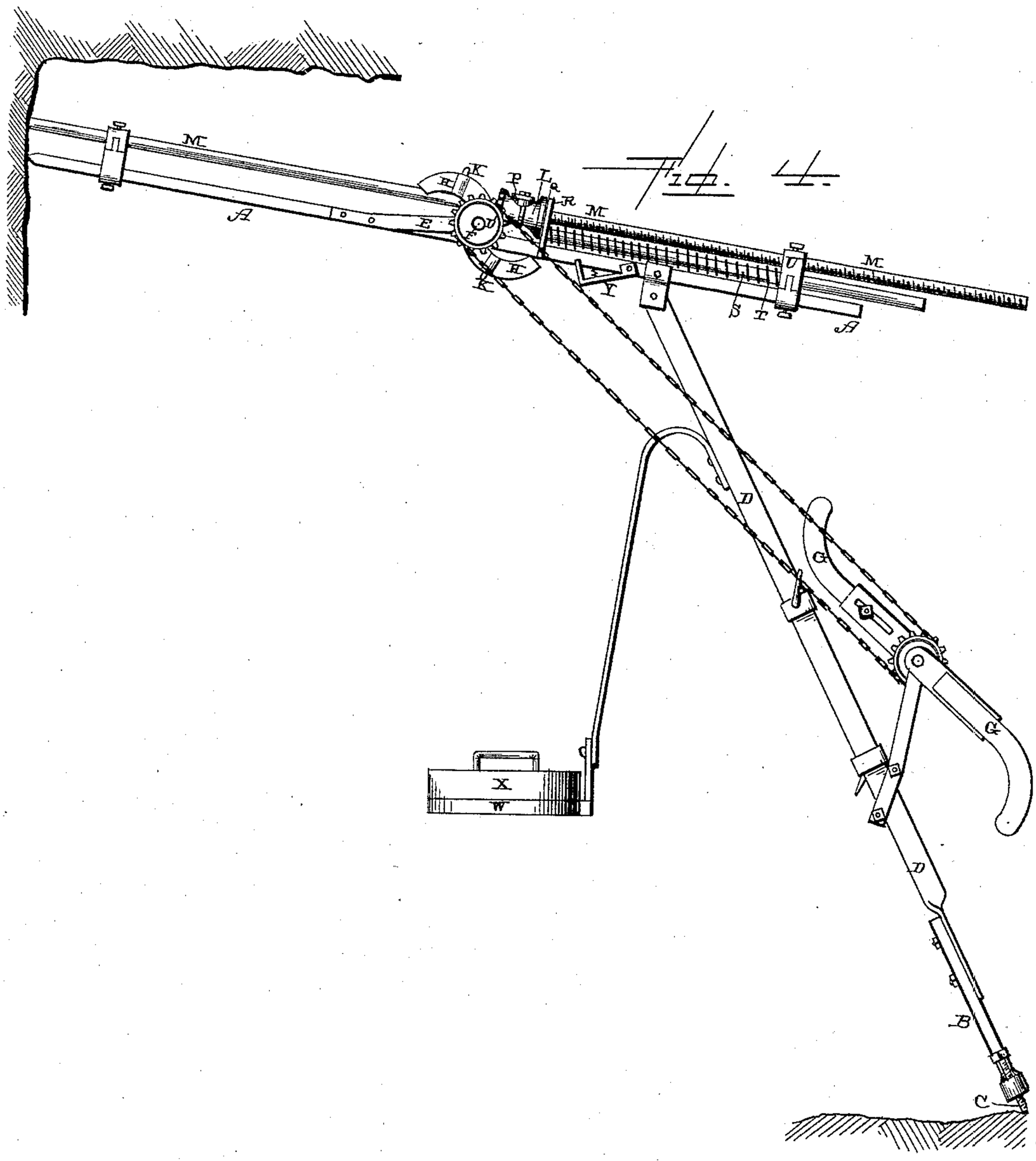


Witnesses.
L. F. Gardner.
Edm. P. Ellis.

Inventor.
Wm. Weaver,
per F. A. Lehmann, atty.

(No Model.)

3 Sheets—Sheet 3.

W. WEAVER.

ROCK DRILL.

No. 387,127. Patented July 31, 1888.

Fig. 5.

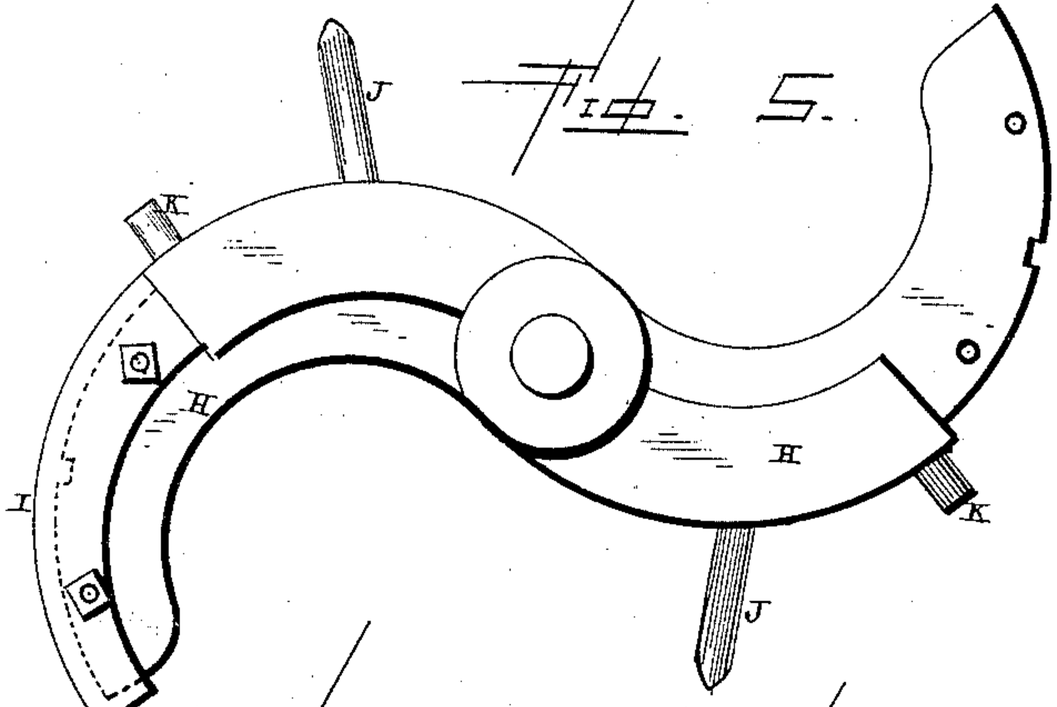


Fig. 6.

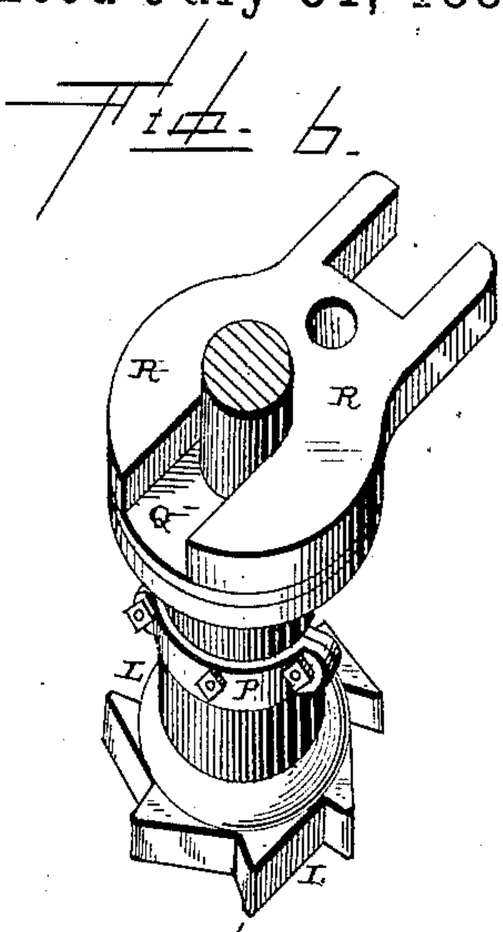


Fig. 7.

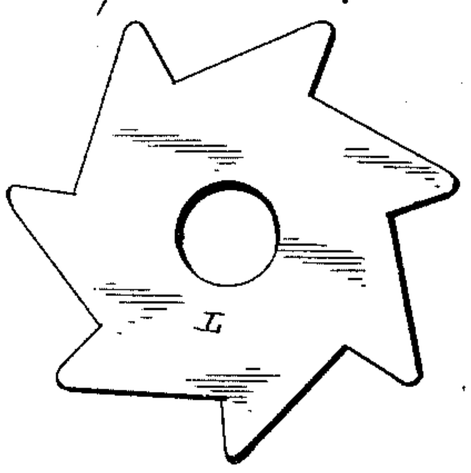


Fig. 8.

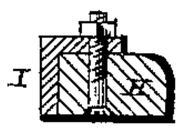


Fig. 10.

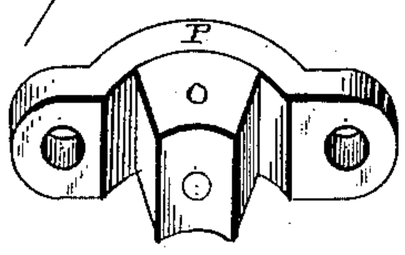
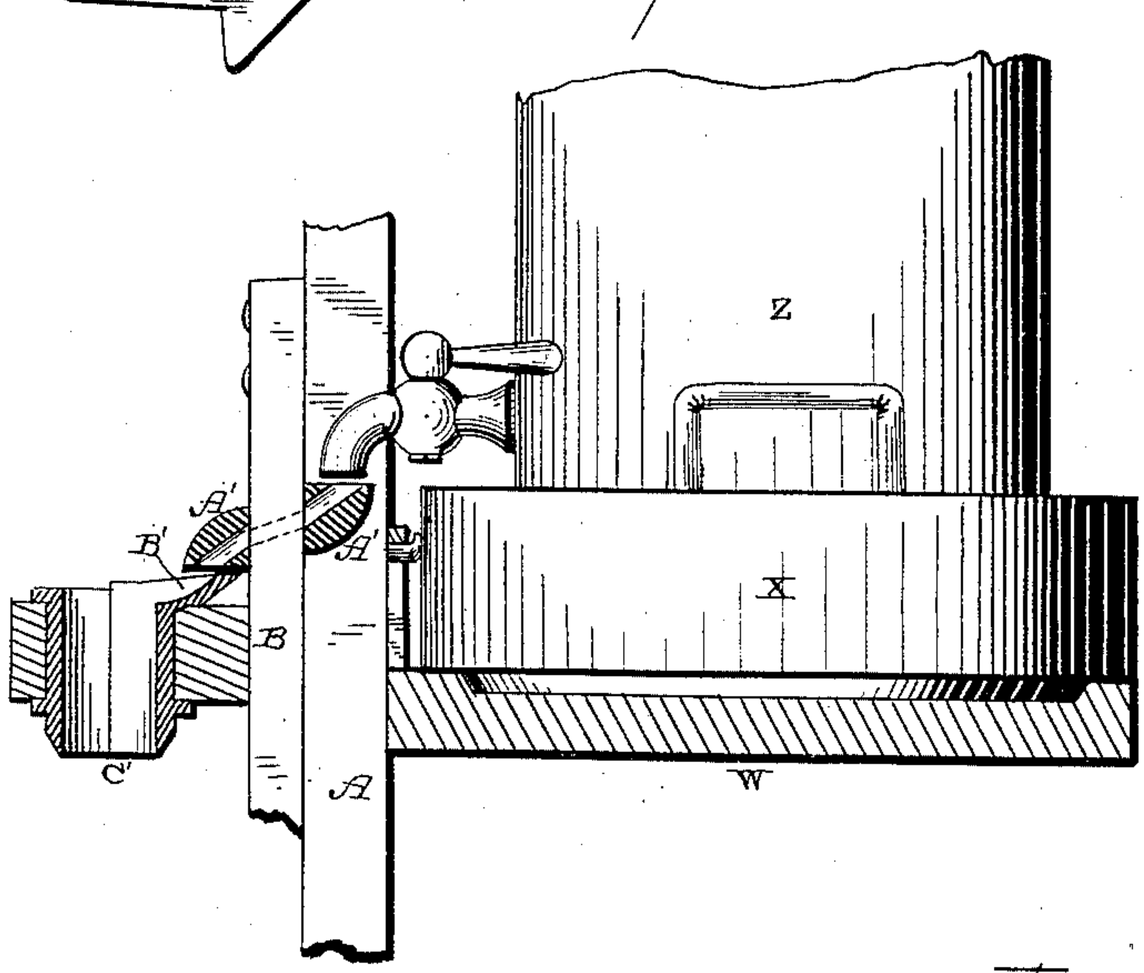


Fig. 9.



Witnesses.
C. A. Gardner
Edm. P. Ellis.

Inventor.
Wm. Weaver,
per J. A. Lehmann,
atty.

UNITED STATES PATENT OFFICE.

WILLIAM WEAVER, OF PHŒNIXVILLE, PENNSYLVANIA.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 387,127, dated July 31, 1888.

Application filed June 14, 1887. Serial No. 241,256. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WEAVER, of Phœnixville, in the county of Chester and State of Pennsylvania, have invented certain new and useful Improvements in Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in rock-drills.

The object of my invention is to provide a light portable drilling-machine which can be operated either by steam or man power, and which is adapted for working in quarries, mines, sinking shafts, driving tunnels, drilling plug-holes, and channeling rocks.

Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a front view of the same. Fig. 3 is a perspective of the ratchet-nut, drill-rod, and cam-arms provided with projections. Fig. 4 is a side elevation of a machine, showing it adapted for working in mines. Figs. 5, 6, 7, 8, 9, and 10 are detail views of the different parts.

A represents a suitable rod or bar of any suitable length, and which is detachably connected at its lower end with the triangular-shaped plate B, which has the leveling-screws C to pass through its lower ends, as shown. This plate B is adapted to be removed from the lower end of the rod A and applied to the rear leg, D, which is pivoted at its upper end near the top of the bar A when the machine is being used in drilling a tunnel or sinking a shaft, as shown in Fig. 4. This rear leg, D, is made adjustable in length, in the usual manner, and supports the machine either in a vertical position or at any suitable angle, as may be preferred. Secured to the bar A, at any suitable distance above its lower end, are the two bearings E, in the upper ends of which is journaled the operating-shaft F, to which are secured the two handles G and the two cam-arms H. These handles are made adjustable in length, so that a greater or less power can be applied thereto, as may be desired. The two cam-arms are cast in a single piece, as shown in Fig. 6, and are each provided with removable caps I, which are made of Babbitt or some anti-frictional metal, and which caps are made removable from the arms at will. These caps serve both to protect the arms from wear while operating and to decrease the friction and cause the machine to run more easily than would be the case if anti-friction metal were not used. As these caps can be replaced as fast as worn out, it will readily be seen that the cam-arms will last indefinitely. Each cam-arm is provided with a curved projection, J, and a short stud, K, which is made perfectly straight. As the cam-arms H are caused to revolve, the curved projections J first strike against the cogs of the ratchet-nut and thereby cause it to rotate upwardly upon the screw-threaded drill-bar M, and then the short studs K come in contact with one of the teeth of the ratchet-nut and again cause the nut and the drill-bar to rotate together. When the curved projection J engages with a cog upon the ratchet-nut, it causes the nut to rotate upwardly upon the drill-rod M, and thus feed the rod forward as it penetrates the stone. The drill-rod does not rotate with the ratchet-nut during this movement, but simply feeds the drill-rod forward. As soon as this curved projection J slips from the tooth of the nut, a short stud, K, engages another tooth of the nut, and as the cam lifts the drill-rod and the nut the short stud causes both the nut and drill-rod to rotate together, so that the drill will cut in a new place. The curved projection J does not turn the drill-rod with the ratchet-nut, for the reason that the drill has just struck the rock and made an incision therein, and which prevents it from turning. As the cam advances toward the short stud K, the arm lifts the drill-rod out of this incision, and thus leaves it free to turn with the ratchet-nut.

The ratchet-nut L has an uneven number of teeth, which are arranged eccentrically around the opening through which the drill-rod passes. An uneven number of teeth are used, so that the drill-rod will never strike in the same place, as it would do if an even number of teeth were

used. The teeth are made of an unequal length, as here shown, so that the studs K will rotate the drill an irregular distance, and thus cause the drill to cut always in a different place, and thus drill the hole more regularly and work faster than would otherwise be the case. The longer the cogs the greater the amount of movement, and the shorter the cogs the less the amount of movement, that is given to the drill at each stroke of the cam-arms. In order to prevent the ratchet-nut from rotating too freely upon the drill-bar, and with a view of giving the operator a complete control of the drill-bar, a frictional device, O, is used, which engages with the thread of the drill-bar, so as to exert a frictional contact thereon. This frictional device O is made of any suitable material, and is passed through an opening inside of the ratchet-nut, and is bolted to the part P of the clamp, which extends around the ratchet-nut, as shown in Figs. 1, 4, and 7. This frictional device extends to the thread of the drill-bar M and exerts just a sufficient pressure upon the drill-rod to prevent the nut from turning too freely upon the drill-rod.

Resting upon the top of the ratchet-nut is a leather washer, Q, and bearing upon the top of this washer Q is the mandrel-plate R. This washer Q serves as a frictional bearing between the mandrel-plate R and the ratchet-nut L, so as to furnish the amount of friction necessary to assist in preventing it from revolving. The mandrel-plate R has an opening at one end, so as to allow the rod A to pass through it, and has an opening at the other end, so as to allow the drill-rod M to pass through. This plate R serves to support the mandrel S, around which the spiral spring T is placed, and which serves to force the drill-rod downward against the stone. When the ratchet-nut is raised upward by the cam-arms H, the nut raises the mandrel-plate R with it, and thus compresses the spring T against the upper guiding-clamp, U, which is placed upon the rod A. As soon as each arm slips from under the nut, the spring forces downward the plate R, the ratchet-nut, and the drill-rod. When it is desired to remove the drill-bar, the cam-arms are revolved, so that one of them will raise the ratchet-nut, the drill-rod, and the plate R sufficiently high to enable the spring-actuated catch Y to catch under the plate R, and thus keep the spring T compressed. While the spring is compressed this pressure is removed from the drill-rod, and hence it can be freely raised and taken out at the will of the operator. When the drilling is ready to be proceeded with, the operator has but to continue the movement of the cam-arms, when the plate R will be raised to a greater distance and the spring-actuated catch Y will spring outward and thus release the parts without any further attention upon the part of the operator.

In order to weight the machine, a slotted supporting-plate, W, is hooked over a projection upon the rear side of the rod A, and upon this plate W is placed a plate, X, and a bucket or pail, Z, containing water. The weight X and the pail of water serve to weight the frame, so that it will stand firmly in position while the drill-bar is being operated. Projections A′ are cast upon both sides of the tops of triangular-shaped plate B, and through these projections are drilled holes for the passage of the water which runs from the faucet connected to the pail Z. This water is discharged from the outer projection, A′, directly upon the lip B′ of the removable box or bearing C, which is placed in the lower clamp connected to the rod A, and serves as a guide for the lower end of the drill-bar. The boxes C′ are made removable from the clamp at will, so as to accommodate the size of the bits being used. The water flows through the projections A′, down the lip B′ directly to the bit, and down the bit into the hole which is being drilled, which makes the bit self-cleaning.

When a machine is to be used for drilling a tunnel, the triangular-shaped plate B is removed from the lower end of the rod A and is transferred to the leg D, and then the rod A, carrying the drilling mechanism, as above described, is raised upward above a horizontal line. While in this position the drilling mechanism is too high to be operated by the handles, and hence the handles are removed and a sprocket-wheel, D′, is placed upon the operating-shaft. Similar bearings to the ones E are clamped to the leg D, and in these bearings the operating-shaft, having handles G connected to it, is journaled. Upon this shaft is placed another sprocket-wheel, and around the two sprocket-wheels is passed an operating-chain, as shown. By turning the handles the chain is caused to operate the drilling mechanism, as above described.

In order to steady the machine in place and to keep it firmly against the rock, the plate or frame W and the plate X are attached to the leg D, in the manner shown.

Having thus described my invention, I claim—

1. The combination of the drill-rod with the ratchet-nut having the opening for the drill-rod made eccentrically through it, so that the teeth of the nut can be longer upon one side than the other and thus rotate the drill-bar irregularly, substantially as set forth.

2. The combination of the rod A, the plate or frame W, the weight X, and a reservoir of water, with the triangular-shaped plate B, provided with perforated projections A′, and the guide C, provided with a lip, B′, substantially as shown.

3. The combination of the rod A, the operating-shaft journaled in suitable bearings, the cam-arms, the ratchet-nut, the mandrel-plate, the mandrel, the spring which is placed around the mandrel, the guiding-clamp U, and the spring-catch Y, which catches under the man-

drel-plate and holds the spring in a compressed position, so as to allow the drill to be removed, substantially as described.

4. The combination of the rod A, the drilling mechanism connected thereto, the leg D, pivoted to the rod A, the triangular-shaped plate connected to the leg, an operating-shaft journaled in suitable bearings and provided with handles, a sprocket-wheel upon the shaft, a sprocket-chain, and a sprocket-wheel connected to the operating-shaft of the drilling mechanism, substantially as shown.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM WEAVER.

Witnesses:

M. A. BALLINGER,

EDM. P. ELLIS.