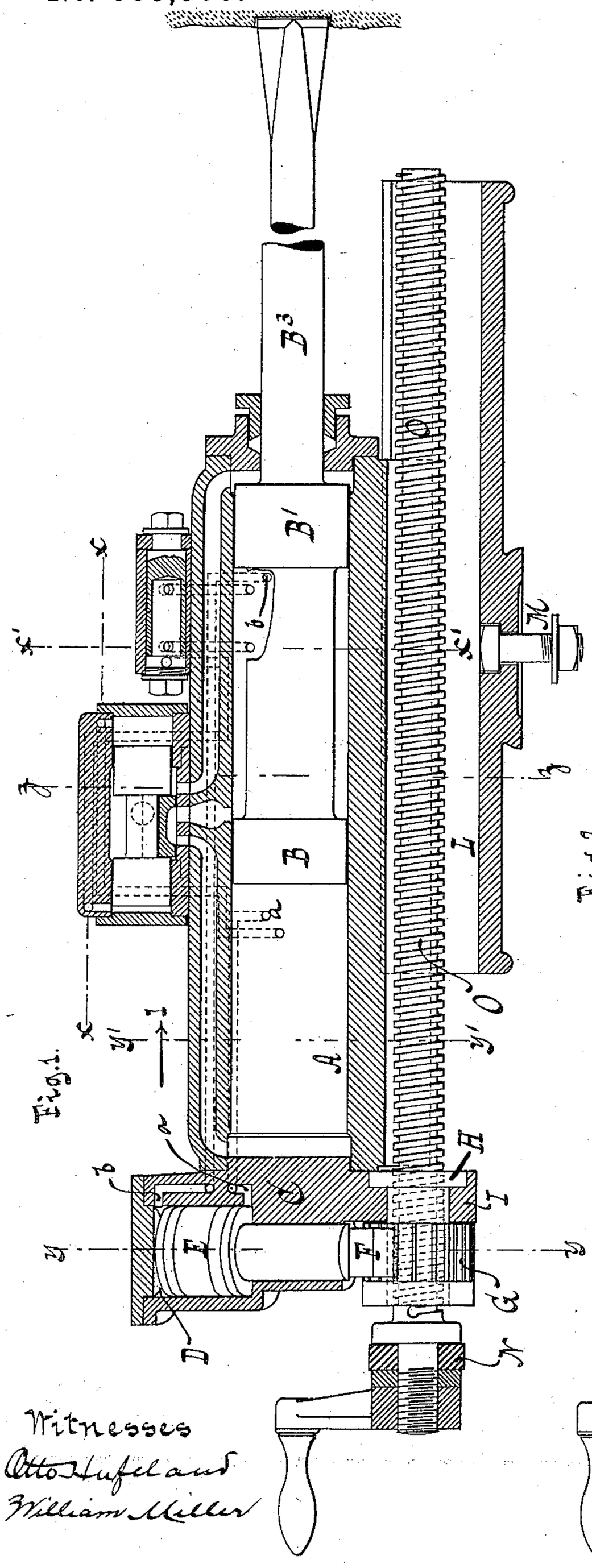
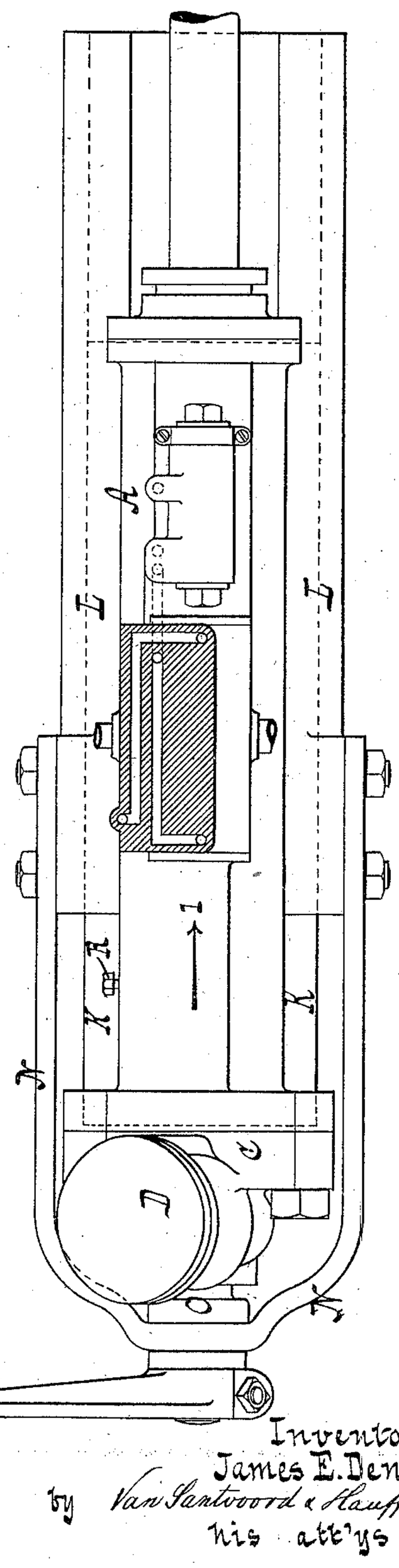
(No Model.) 2 Sheets—Sheet 1.

J. E. DENTON.

ROCK DRILL.

No. 335,900. Patented Feb. 9, 1886.





Witnesses
Otto Hufeland
William Miller

Inventor
James E. Denton
by Van Santvoord & Hauff
his att'ys

(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

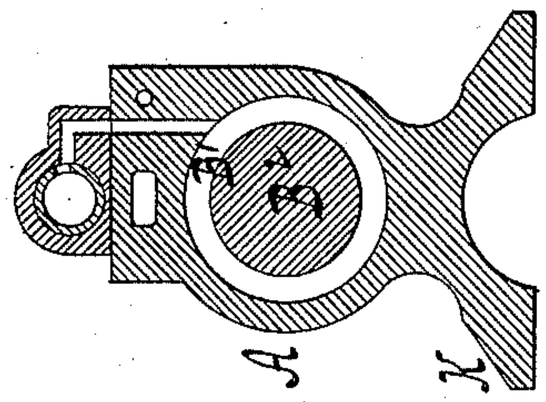


Fig. 4.

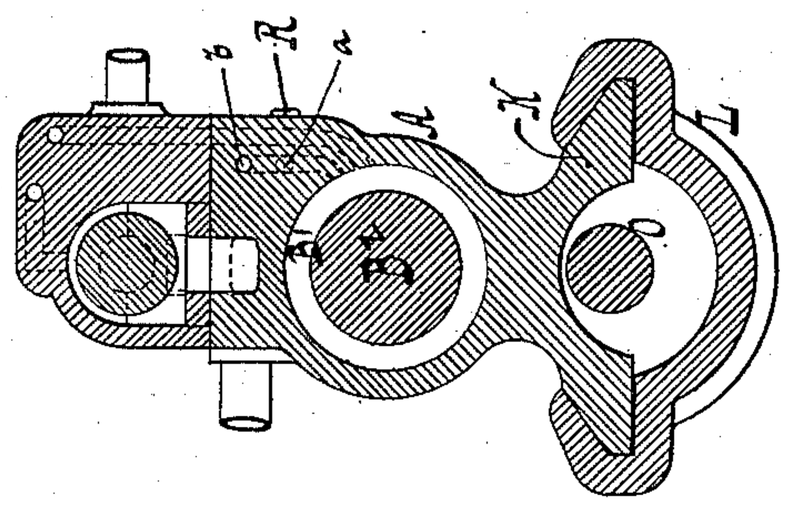


Fig. 6.

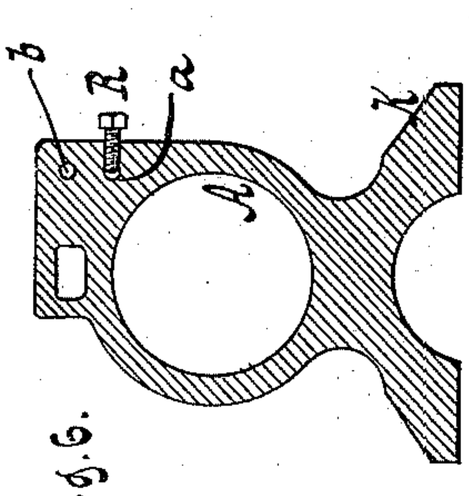
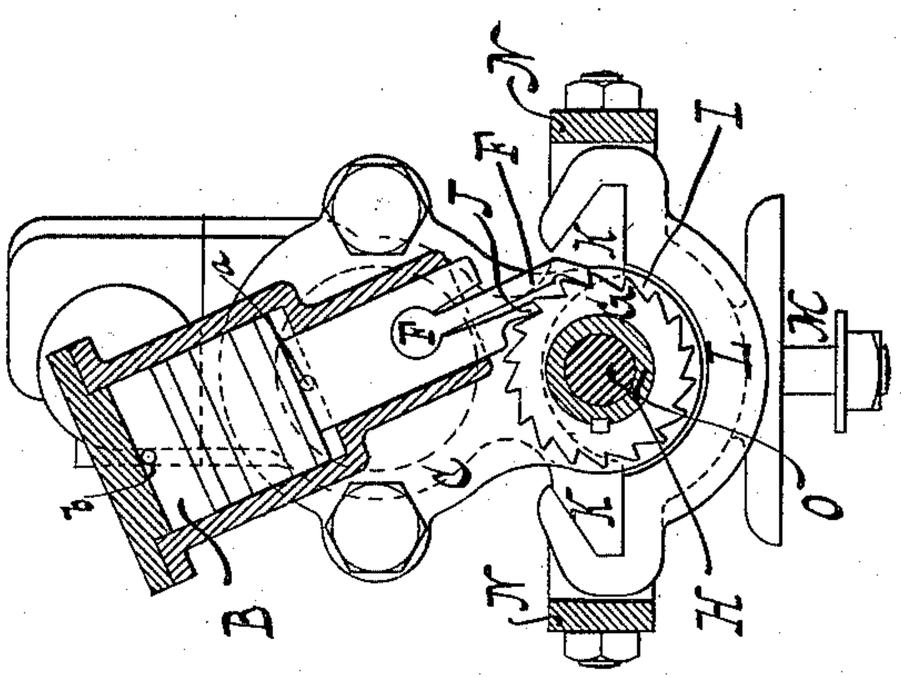


Fig. 3.



Witnesses
Otto Hupfeld
William Miller

Inventor
James E. Denton
by Van Santwood & Hauff
his att'ys

UNITED STATES PATENT OFFICE.

JAMES E. DENTON, OF HOBOKEN, NEW JERSEY.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 335,900, dated February 9, 1886.

Application filed October 15, 1885. Serial No. 179,989. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. DENTON, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented new and useful Improvements in Automatic Feed for Rock-Drills, of which the following is a specification.

My invention relates to improvements in automatic feeds for rock-drills; and it consists in certain novel features of construction, which are fully pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which I have shown my improvement attached to the motor shown in my Patent No. 325,508, dated September 1, 1885.

In the drawings, Figure 1 is a longitudinal vertical section. Fig. 2 is a longitudinal horizontal section in the plane *x x*, Fig. 1. Fig. 3 is a transverse section in the plane *y y*, Fig. 1. Fig. 4 is a transverse section in the plane *z z*, Fig. 1. Fig. 5 is a transverse section in the plane *x' x'*, Fig. 1. Fig. 6 is a transverse section in the plane *y' y'*, Fig. 1.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates the main cylinder of an engine worked by steam or compressed air, of the kind generally used for operating rock-drills. The main piston, which works in this cylinder, has two heads, B B', which are connected by a bar, B^2, of a smaller diameter, so as to leave an annular steam-space between it and the inner surface of the cylinder. The drill proper may be attached to the piston-rod B^3 in any manner. The steam may be supplied to or exhausted from this cylinder in any manner; but I prefer to employ my steam-actuated valve described in the above-named patent.

In the head C of the main cylinder is formed a secondary cylinder, D, in which works a secondary piston, E. To this piston is pivoted a feed-pawl, F, which engages a ratchet-wheel, G, secured to the feed-nut H, journaled in a lug, I, projecting from the head C. The secondary piston also carries a stop, J, (Fig. 3,) which engages the teeth of the ratchet-wheel as the pawl F operates, and prevents the same from being turned more than one tooth at the time. As the normal position of the secondary piston is as shown in Fig. 3, the stop also holds the wheel in position and prevents the same from turning backward through any jarring which may be caused by the operation of the machine.

On the outside of the main cylinder is formed a slide, K, which is fitted into a guide-block, L, pivoted to the frame of the machine by the bolt M. To this guide-block is attached a yoke, N, Fig. 2, in which the feed-screw O is mounted in such a manner that it cannot rotate. As the feed-nut H is turned on the said feed-screw, by the action of the secondary piston E and its pawl F on ratchet-wheel, the main cylinder, with the main piston and drill, is moved forward in the direction of arrow 1, Figs. 1 and 2.

It remains now to explain how the secondary piston is operated. In addition to the steam-passages necessary to operate the main piston, the main cylinder is provided with two passages, *a b*, which open into the main cylinder and communicate with the secondary cylinder D. As will be seen in Fig. 1, the steam-passage *a* leads to the lower end while the passage *b* leads to the upper end of the secondary cylinder D, and in the position shown both communicate with the exhaust, so that the secondary piston E will not move. The passage of steam through these passages is controlled by the heads B B' of the main piston, as follows: When the machine is first set in operation, the main cylinder is at the upper end of the feed-screw, and so that the drill rests against the rock when the main piston, to which it is attached, is in its lower position, but not low enough to uncover the passage *a*, through which steam passes to the lower part of the secondary cylinder. As the machine operates, and the drill cuts into the rock, the motion of the main piston is increased in the direction of its work until the head B passes the passage *a* and admits live steam into it, which, passing through said passage and under the secondary piston E, will cause the same to move up and away from the ratchet-wheel G, secured to the feed-nut; but as the next movement of the main piston again admits steam to the passage *b*, while it brings the passage *a* into communication with the exhaust, the secondary piston E is again forced down, and the pawl carried by it will engage the ratchet-wheel, moving it forward one tooth, thereby turning the feed-nut and causing the main cylinder to be fed forward, as above de-

scribed. The secondary piston then remains at rest in its lower position until the drill has entered the rock sufficiently to again uncover the passage *a*, when the operation just described is repeated.

To prevent steam from any leakage which may be caused by the wearing of the piston-heads or the cylinder from actuating the secondary piston, I provide a throttling device in one or both of the steam-passages *a b*. In this instance I have shown a screw, R, which enters the steam-passage *a*, and by which the latter may be partly or wholly closed. By means of this device the size of the steam-passage may be so regulated that only live steam will pass through it with sufficient force to raise the secondary piston, while the leakage from the exhaust will condense before it can pass through the steam-passage thus reduced.

From the above description it will be understood that the motion of the main piston toward the work is governed by the position of the passages *a b* in the main cylinder, and the latter, if properly placed, will automatically prevent the main piston from striking the lower head, P, of the main cylinder by admitting steam to the secondary cylinder, and thereby bringing the feed in operation. It will also be seen that the secondary piston will normally remain in its lower position, acting as a stop and preventing any improper operation of the feed.

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

1. The piston-rod carrying the drill in line therewith, and provided with two piston-heads, B B′, connected by a bar, B^2, to provide an intervening annular space, the main cylinder having the secondary cylinder D attached directly to its cylinder-head C, and containing the secondary piston E, the steam-passages *a b*, extending through said main cylinder and communicating with opposite ends of the secondary piston, and the pawl F, carried by the latter, in combination with the nut H, journaled in a lug, I, on the main cylinder-head, the ratchet-wheel G, fixed to the nut, the feed-screws O, the slide K on the main cylinder, the pivoted guide-block L, in which said slide fits, and the yoke N, attached to the guide-block and in which the feed-screws are mounted, substantially as described.

2. The combination of the main cylinder A, the piston-heads B B′, connected to form a steam-space between them, the secondary cylinder D, the steam-passages *a* and *b*, for conducting steam from the main cylinder to the secondary cylinder, the non-rotating feed-screw O, the nut H, journaled in the main cylinder head, the ratchet-wheel G, connected with said nut, and the secondary piston provided with a pawl, F, to turn the ratchet-wheel and nut, and with a stop, J, to engage said wheel and prevent the nut from turning more than the required distance, substantially as described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

JAMES E. DENTON. [L. S.]

Witnesses:

A. FABER DU FAUR, Jr.,

E. F. KASTENHUBER.