H. MORSE.

Rock-Drilling Machines.

No. 223,529. Patented Jan. 13, 1880.

Fig. 1.

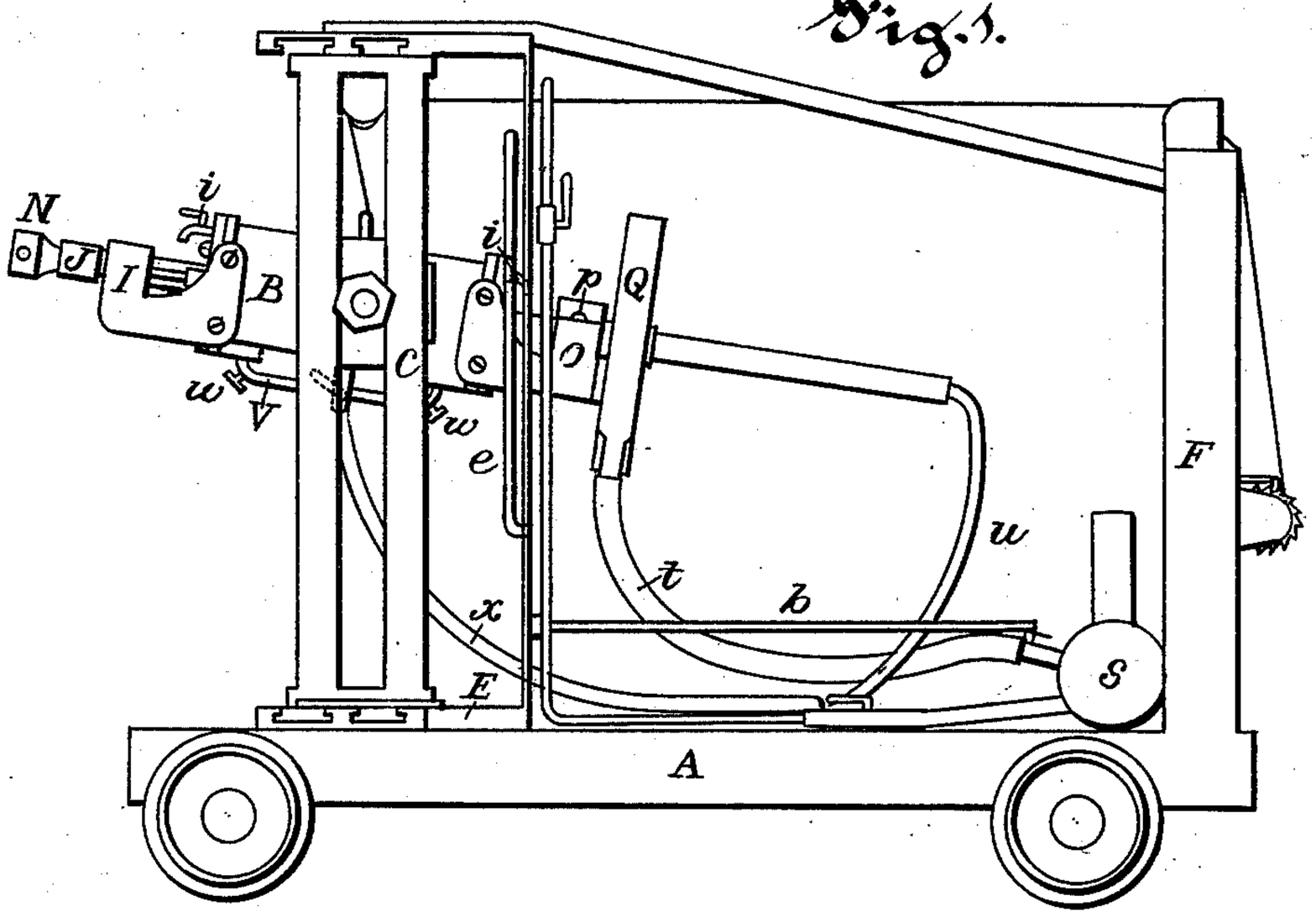
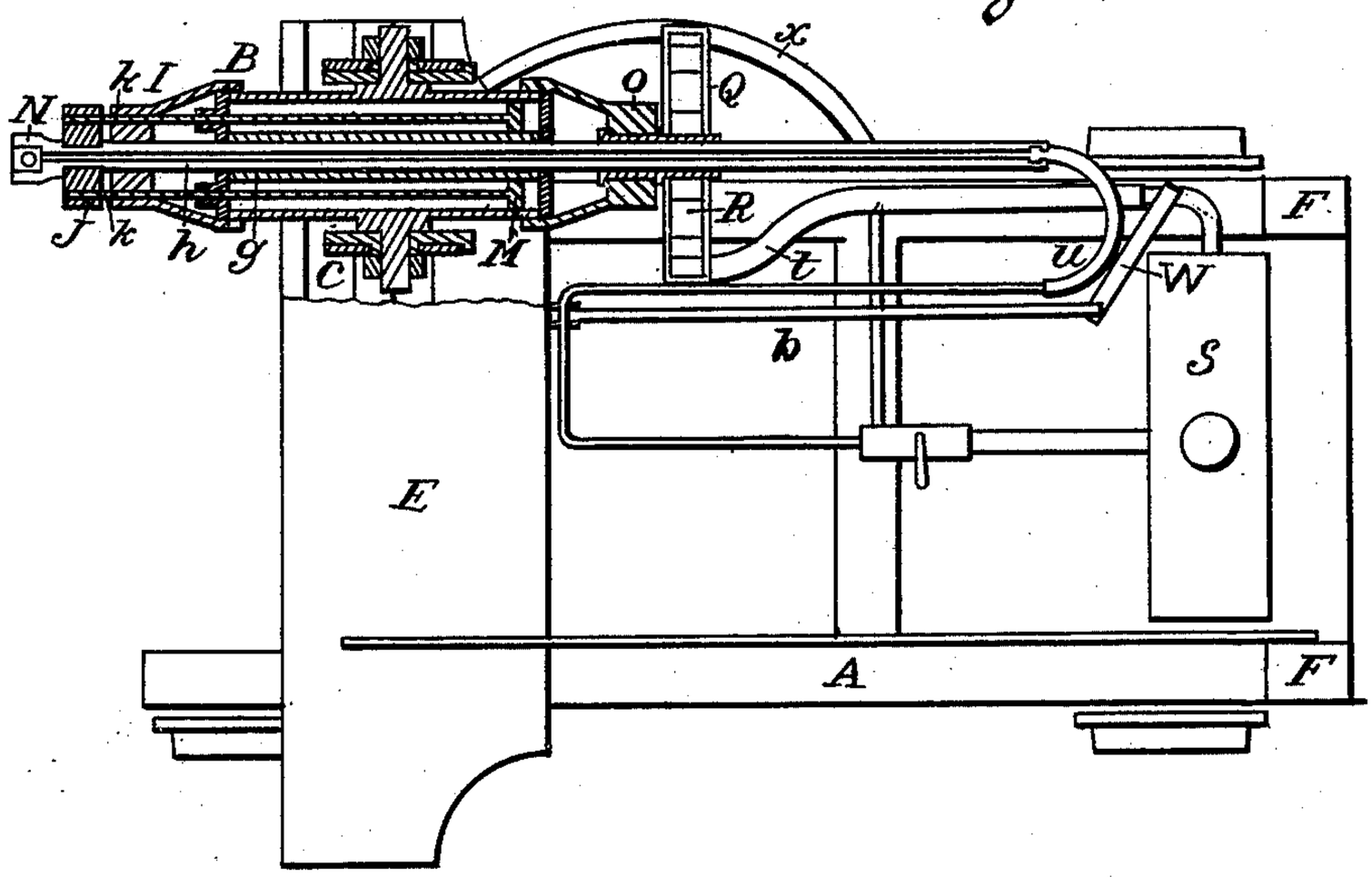


Fig. 2.



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ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 223,529, dated January 13, 1880.

Application filed August 4, 1879.

To all whom it may concern:

Be it known that I, HARRIS MORSE, of the town of Columbia, county of Tuolumne, State of California, have invented certain new and useful Improvements in Rock-Drilling Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention has reference to that class of rock-drilling machines known as "boring-drills," in which class the diamond drill stands foremost, and it is more particularly to this drill that my invention is intended to be applied, although it can be used with any style of boring-drill.

My invention relates to the arrangement for driving and feeding the drill by hydraulic force or pressure, as hereinafter described.

Referring to the accompanying drawings, Figure 1 represents a side elevation, and Fig. 2 a plan view, of my improved rock-drilling machine.

Let A represent the car or carriage upon which the drilling-machine is mounted. The drill-frame which I use is constructed similar to the one for which Letters Patent No. 39,235 were issued to Rudolph Leschot on the 14th day of July, 1863, and reissued to A. J. Severance on the 16th day of February, 1869, and again reissued to A. J. Severance on the 26th day of October, 1869, in that the drill-cylinder B is mounted on trunnions in a supplemental swiveling frame, C, so that it can be raised or lowered and adjusted in either direction, while the supplemental frame is mounted so as to slide horizontally in the main frame E. This drill-frame I place upon the front end of the carriage, and secure it firmly in place by bolting its base or bed plate to the timbers of the frame and bracing its upper end from upright timbers F F at the rear end of the carriage. I use this drill-frame because it is the most convenient and desirable device in use for that purpose; but my invention does not depend upon any particular style of frame.

The cylinder B is bored out considerably larger than the drill-shaft, and it has a head covering each end similar to the head of steam or water cylinders. A hole is made through the center of each head, which is large enough to allow the drill-shaft to pass freely through. A tube, *g*, the bore of which corresponds in size with the holes in the cylinder-heads, has one end secured to the inside of the rear cylinder-head around the central hole, and it extends centrally through the cylinder, so that its opposite end abuts against the opposite head around its central hole. The drill-shaft *h*, which is tubular, as usual, passes through this central tube, which prevents it from coming in contact with the water, and at the same time obviates the necessity of stuffing-boxes.

To the forward end of the cylinder B, I secure a yoke, I, which passes across in front of the end of the cylinder. A hole is made through the center of this yoke, which is large enough for the drill-shaft to move easily through, and on each side of this central hole a smaller hole is made. A small hole is also made through the front cylinder-head on each side of the central hole, corresponding with and in line with the small holes in the yoke.

J is a cross-head, which has a small rod, *k*, extending from each end, so as to pass through the small holes in the yoke and through stuffing-boxes around the small holes in the head of the cylinder, and their opposite ends are secured to an annular piston, M, which moves in the cylinder around the central tube.

The drill-shaft *h* passes through the middle hole in the yoke I, and its forward end is reduced so as to form a journal, which passes through the middle hole in the cross-head J, the head N, in which the drill rod or tube is held, being secured to the end of the journal outside of the cross-head, so that when the piston moves outward in the cylinder it will force the drill-shaft along with the cross-head. A tube, V, connects both ends of this cylinder, similar to ports of a steam-engine, and a flexible tube connects the middle of this tube V with a source of water-pressure, as hereinafter described. A cock, *w*, on each side of the connection serves to direct the water to either end of the cylinder, as desired. A discharge-cock, *i*, is placed in each head of the cylinder, so as to discharge the water from in front or rear of the piston, as desired, after it has made its stroke. A yoke, O, is secured to the rear end of the cylinder, so as to pass across its end,

and in its middle is a box, *p*, in which the drill-shaft is supported. Secured to the rear yoke, O, is a circular case or shell, Q, through the center of which the drill-shaft passes. Inside of this shell or case is a water-wheel, R, which is secured upon the shaft by a gib or pin moving in a longitudinal groove in the shaft, so that the shaft will be driven by the rotation of the water-wheel, but can move longitudinally through the center of the wheel.

Upon the rear end of the carriage A is a steam-pump, accumulator-chamber, or other water-forcing device, S, which is connected by a flexible tube, *t*, with the wheel-case Q, for supplying a stream of water for driving the water-wheel and drill-shaft. Another flexible tube connects a branch tube, which leads from the accumulator chamber or pump, with the bore through the drill-shaft for supplying a stream of water through the tubular drill-rod, while still another flexible tube connects the same branch tube with the tube V, that feeds the water into the cylinder.

A single stop-cock serves to regulate the flow of water through these two tubes, and a lever, W, is secured to the main stop-cock that lets the water on and shuts it off from the water-wheel, and this lever is connected by a rod, *b*, and lever *e* with the front end of the carriage, so that the operator can, by merely moving a lever within easy reach, start and stop the drill at pleasure.

The tubular drill-rod, which does the boring, is secured in the head N on the front end of the drill-shaft, so as to project in front of the machine. The cylinder having been set so as to fix the drill in the desired boring position, the operator sees that the cock *w*, which admits the water in front of the piston, is closed and the rear cock open. He also sees that the front discharge-cock *i* of the cylinder is open and the rear discharge-cock *i* is closed, and that the cock which admits water to the interior of the drill-rod and feed is open. He then opens the valve that admits water to the wheel by means of the lever *e*, and the drill is set in motion.

The water which passes through the tube *x* passes behind the annular piston and presses it forward, thus carrying the cross-head and drill-shaft with it through the medium of the small pushing piston-rods *k k*.

When the piston has traversed the length of the cylinder the rear discharge-cock *i* is opened and the front one closed, the front cock *w* on the feed-tube V is opened and the rear one closed, thus transferring the water-pressure to the front of the piston, so as to drive the piston back and force the water, which is behind it, out through the rear discharge-cock *i*. A longer drill-rod can then be substituted and the operation repeated.

By this means I accomplish the entire operation of drilling by hydraulic pressure. The feeding device is especially simple and effective, as it enables me to regulate the feed as desired.

Usually I shall mount two drills in one frame; but for the purpose of this specification I have only represented one.

I am aware that boring-drills have been driven by water-wheels attached to the drill-shaft; but this I do not claim, broadly.

What I do claim, however, and desire to secure by Letters Patent, is—

1. The cylinder A, mounted on trunnions, as described, and having the tube *g* passing through its center, in combination with the annular piston, with its pushing piston-rods *k k*, and cross-head J, said cross-head being attached to the drill-shaft, as described, substantially as specified.

2. The cylinder A, with its front yoke, I, and rear yoke, O, for guiding the drill-shaft, said rear yoke having the water-wheel case Q secured to it, substantially as above specified.

3. The cylinder A, with its central tube, *g*, annular piston M, piston-rods *k k*, yokes I O, and discharge-cocks *i i*, in combination with pump or pressure-tank S, flexible tube X, and connecting-tube V, with its cocks *w w*, all combined and arranged to operate substantially as and for the purpose described.

4. A steam-pump or pressure-tank, S, located upon the same carriage that the drilling-machine is carried upon, in combination with the water-wheel R, attached to the drill-shaft, as described, and the tubes *t u x*, for supplying water from said tank for operating the water-wheel and feeding the drill, substantially as above described.

5. The arrangement for enabling the operator at the front of the machine to open and close the main cock that admits water to the water-wheel, consisting of the lever W, connecting-rod *b*, and lever *e*, substantially as above described.

In witness whereof I have hereunto set my hand and seal.

HARRIS MORSE. [L. S.]

Witnesses:
LEE D. CRAIG,
C. E. BUCKINGHAM.