

A. KIRK.
ROCK DRILLING MACHINE.

No. 170,479.

Patented Nov. 30, 1875.

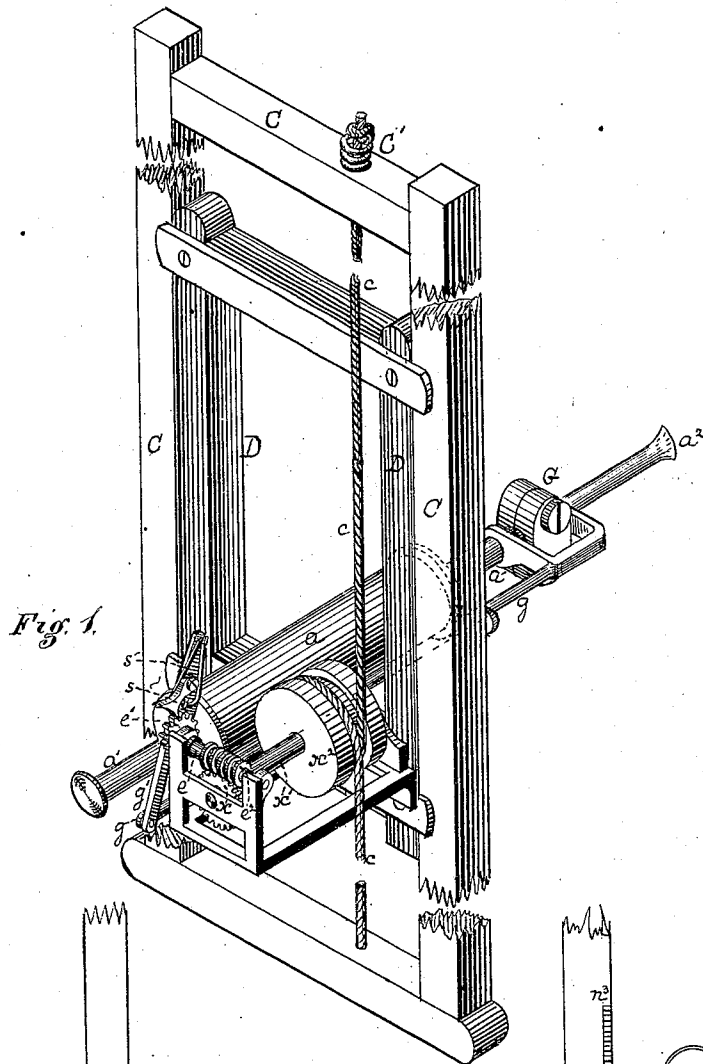


Fig. 1.

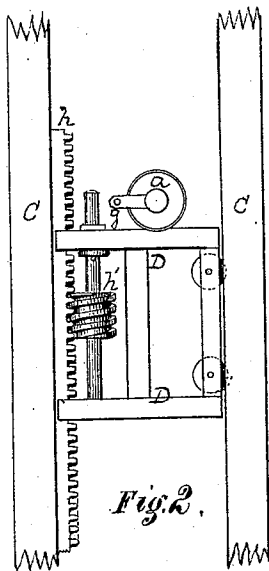


Fig. 2.

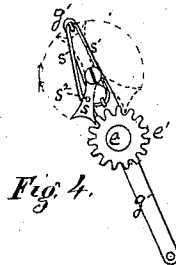


Fig. 4.

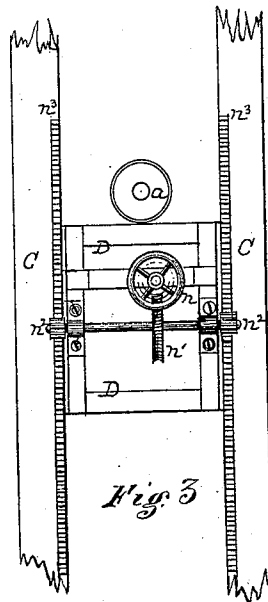


Fig. 3.

Witnesses } James L. May, Inventor Arthur Kirk
Fred. Standish } by Batewell, Chnsty & Kerr,
his Attys.

A. KIRK.
ROCK DRILLING MACHINE.

Patented Nov. 30, 1875.

No. 170,479.

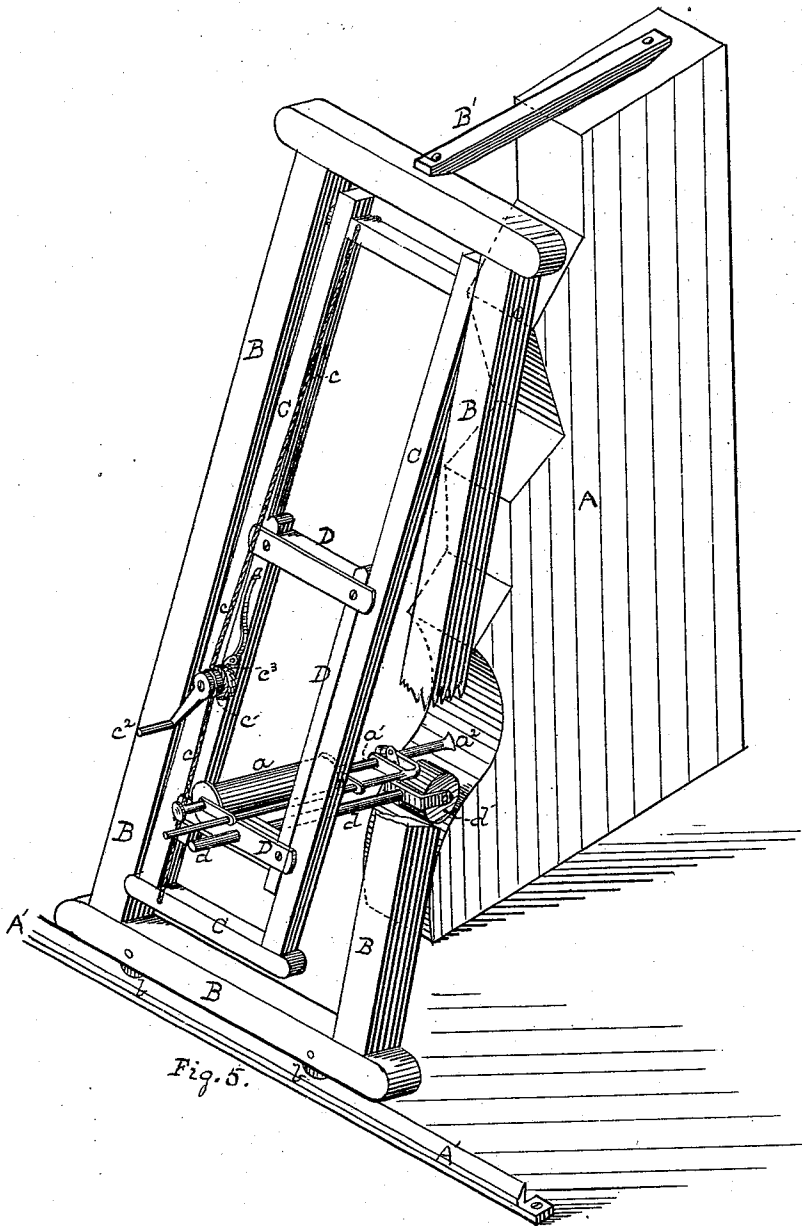


Fig. 5.

Witnesses { James E. Kay
Fred. Staudisch

Inventor Arthur Kirk,
by Bakewell, Christy & Kerr,
his attys.

UNITED STATES PATENT OFFICE.

ARTHUR KIRK, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN ROCK-DRILLING MACHINES.

Specification forming part of Letters Patent No. **170,479**, dated November 30, 1875; application filed November 12, 1873.

To all whom it may concern:

Be it known that I, ARTHUR KIRK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rock-Drilling Machine; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings in two sheets, in which—

Figure 5, Sheet 2, represents, by perspective view, the general construction and arrangement of my improved apparatus in its relationship to the face or wall of the rock to be drilled. Fig. 1, Sheet 1, represents, by a like view, a detached portion of the same, with additional appliances for the automatic raising and lowering of the drilling apparatus. Fig. 4 is an enlarged side elevation of the crank, arm, pawl, and pinion of Fig. 1; and Figs. 2 and 3 represent modifications of the apparatus.

Like letters of reference indicate like parts in each.

To enable others skilled in the art to make and use my improvement, I will proceed to describe its construction and mode of operation.

The edge of the block A represents the front wall of the rock in which the drilling is to be done. Across the floor, in front of the wall or face of the rock, I arrange a rail or track, A', on which, by means of truck-rollers on wheels b, I mount the frame B, which is made of any suitable size, and support the said frame, at its upper end, by means of an arm, B', which is pivoted thereto, and also to any suitable post or support, in such way that the frame B may have a lateral motion along the track or rail A', and thereby be adjusted at any desired point along the face of the rock to be drilled. Inside the frame C, which frame really constitutes a derrick, at or near its upper end, I pivot the swinging frame C, in such position that the lower end of said frame may swing freely to or from the rock to be drilled. Inside the frame C, and suitably guided between the side rails thereof, so as to be moved readily up and down, I arrange the sliding frame D, which frame carries the drilling apparatus, which consists, in substance, of a drilling-cylinder, a, containing a piston, and furnished with other usual appliances for the

operation of the same by means of steam, air, or other suitable pressure. The drilling-chisel a² is attached to the stem a¹ of this piston, so as to be operated thereby. In order to hold the apparatus at the proper point with reference to the wall or face of the rock to be drilled, I attach to the lower cross-bar of the frame D a stem, d, extending out to a point at or near the end of the chisel when at the termination of its forward stroke, and mount in the end of such stem d a friction-roller, d', which bears against the rock to be drilled, and shifts the drilling apparatus to or from the face of the rock, according to the inequalities or irregularities in the latter, and thereby keeps the drilling apparatus always in the same position with reference to the work to be done. In order to raise and lower the drill, I carry a rope, cord, or chain, c, from the upper to the lower end of the swinging frame C, and between its ends pass it tightly around a spool or drum, c', which is attached to the sliding frame D, and which is operated by means of a crank, c², or other equivalent device, so that, by the rotation of the spool or drum c', the sliding frame D may be raised or lowered at pleasure. To hold it in position when raised I employ a ratchet-wheel and pawl, as shown at c³. I also, as a part of my improvement, make the apparatus so that the drill shall move up and down automatically with each stroke of the chisel, as more fully illustrated in Figs. 1 and 4, in which figures the same letters indicate the same parts as are already described. In this construction I attach to the stem of the piston or of the drill, as shown at G, a rod or shaft, g, the opposite end of which is pivoted to a crank-arm, g', which, in turn, is loosely attached to the end of an axle, e, and affixed onto the same axle is a small pinion, e¹. The crank-arm g' extends upward above the axle e, and carries a double pawl, s, which is pivoted thereto in such position, and so constructed, as to impart motion to the pinion e¹ in either direction simply by being reversed in position, as illustrated by dotted lines in Fig. 4. To hold this pawl s in gear with the pinion e¹ I employ an elastic ring, s¹, of india-rubber or other suitable material, which is secured to the crank-arm g' at two points above

and below the pivoting-point of the pawl, and which bears intermediately on a small pin, s^2 , which extends out from the stem of the pawl. The elasticity of this ring holds the pawl in gear with the pinion e^1 in either position, and, when it is desired to throw the pawl out of gear, also holds the pawl from engaging the pinion. The teeth of the pawl then extend upward, as shown by dotted lines in Fig. 4.

Other suitable spring devices, however, may be employed in lieu of the elastic ring s^1 .

By this means, at each stroke of the drill-chisel, a reciprocating motion is imparted to the rod g , and an oscillating motion to the crank-arm g' , and the latter, by means of the pawl s , communicates an intermittent motion to the pinion e^1 , and through it to the axle e . This axle is provided with a worm, e^2 , which communicates motion to a worm-wheel, x , which latter is arranged on the shaft x^1 , and the shaft carries the spool or drum x^2 . Around said spool or drum x^2 I pass the rope, cord, or chain c , above referred to.

The operation above described will cause a partial rotation of the spool or drum x^2 with each stroke of the chisel, and in a direction up or down, to be determined by the adjustment of the double pawl s on the pinion e^1 , and, operating in connection with the rope c , will raise or lower the sliding frame D, so as to make each successive stroke of the chisel operate against a point in the rock above or below the last preceding stroke, as the case may be; but if it be desired to give a succession of strokes at the same point, the pawl s is thrown out of gear with the pinion e^1 , and so long as it remains so, no change will be made in the vertical adjustment of the chisel. To secure the requisite tension on the rope c I arrange between its knotted end and the cross-bar, to which it is attached, a spiral or other suitable form of spring, C' .

The same appliances for raising and lowering automatically the drill-chisel may be employed to produce a lateral motion of the same chisel, by simply carrying the cord c , or another like cord similarly operated, horizontally instead of vertically, from one fixed post to another set at opposite ends of the wall or rock to be drilled; and such modification in the use of my invention I include as a part thereof.

In the operation of the sliding frame D, in so far as the same enters as an element into

the combinations hereinafter specified, I do not limit myself to the particular construction thus far described for guiding it in its movement, since other suitable devices may be employed in lieu of those described.

In Fig. 2 I have shown a rack, h , which is attached to one of the side rails of the swinging frame C, and with a worm, h' , engaging the same, and so arranged, relatively to each other and to the drill-cylinder a , that the rod g of the same may readily be combined therewith, so as, by a crank-motion and interposed pawl, to effect automatically the vertical adjustment of the frame D; or, as illustrated in Fig. 3, to effect the same adjustment by hand, I employ a hand-wheel, n , on the axle of which is a worm, which meshes into a worm-wheel, n^1 , and the latter, by pinions n^2 on the ends of its shaft, engages with the tooth-racks n^3 , which are attached to the side rails of the swinging frame C. The roller d' I also, in some cases, arrange to one side of a vertical line passing through the chisel, so that by the use of a separate guide, against which it may bear, to face up the rock or dress the same to any desired shape, such shape being determined by the shape of the guide, the chisel then, having a fixed length of stroke, will drill to pattern. A weight may, of course, be substituted for the spring C' .

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

1. In combination with a drill, the derrick B, swinging frame C, and adjustable frame D, provided with the friction-pulley and rope, or similar devices for operating the frame, substantially as specified.

2. In combination with the drill-cylinder and its swinging and sliding frames C D, a friction-roller, d' , substantially as and for the purpose specified.

3. The combination of the frame D, rod g and its crank-arm, pinion e^1 , and pawl s , substantially as and for the purpose specified.

4. The combination of the spool or drum x^2 , rope c , and spring C' , or equivalent weight, substantially as set forth.

In testimony whereof I, the said ARTHUR KIRK, have hereunto set my hand.

ARTHUR KIRK.

Witnesses:

JAMES BLACK,
JAMES I. KAY.