Sheet 1. 2 Sheets.

A. Blatchly,

Rock Drills.

No. 100,252. Patented Mar. 1, 1870.

Fig. 3.

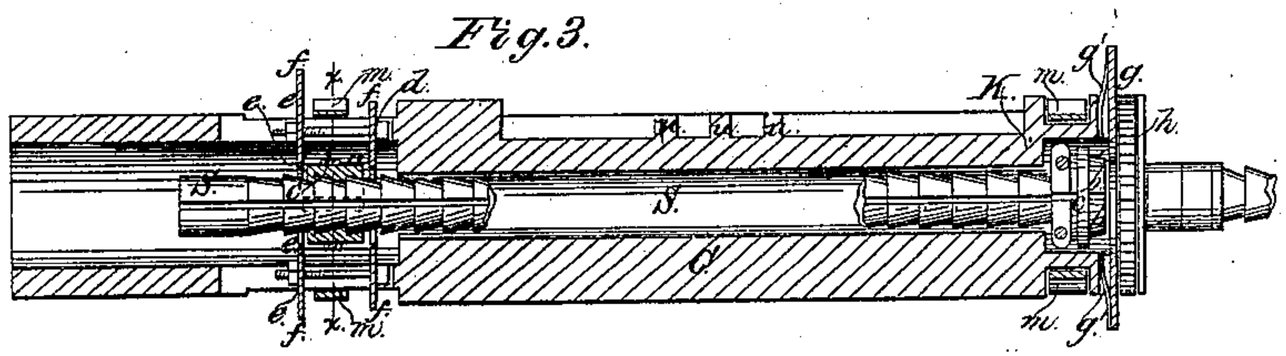

Fig. 2.

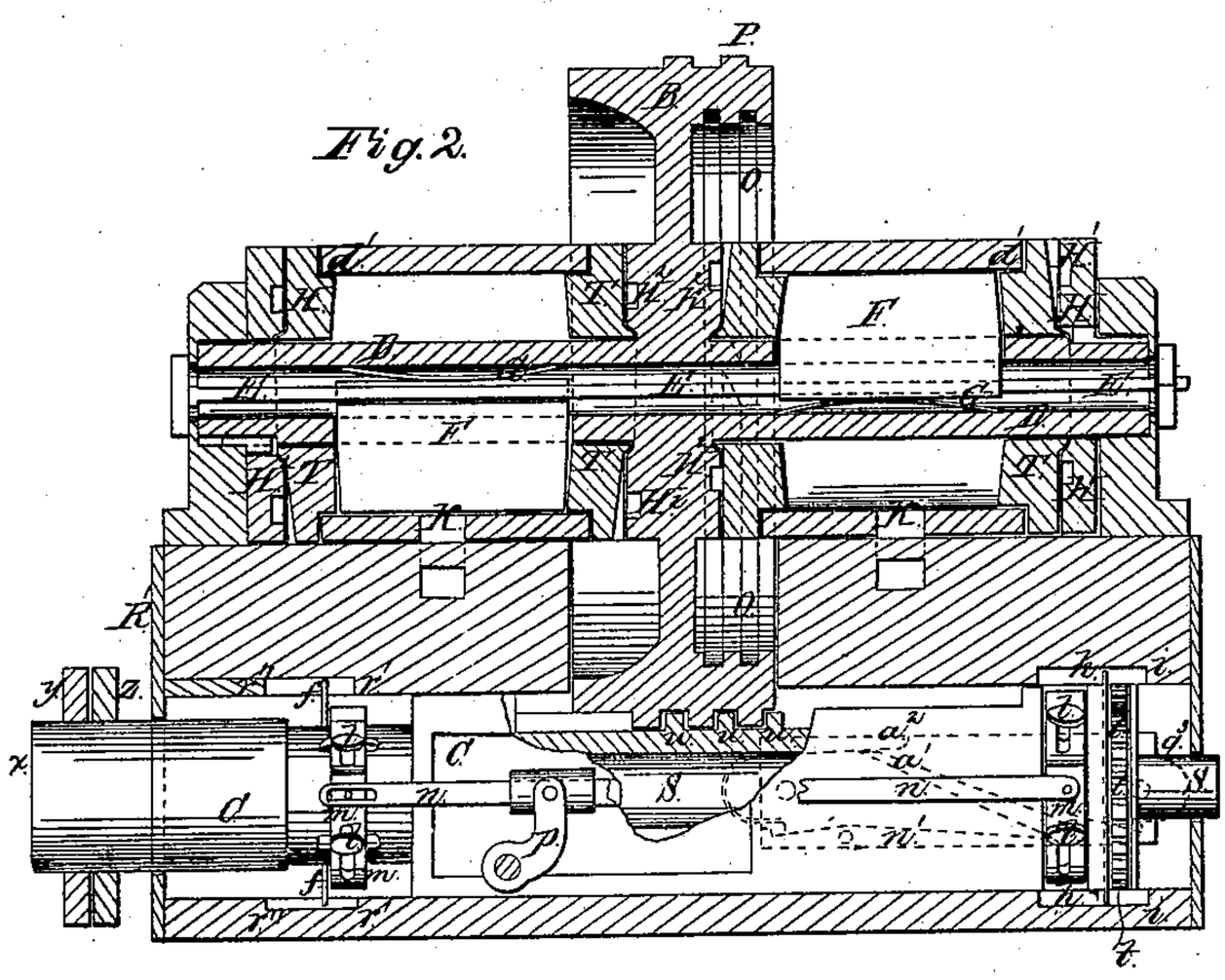

Fig. 4.

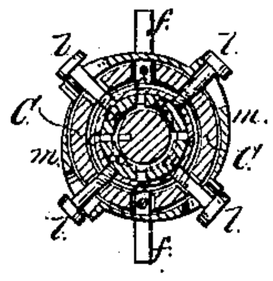

Fig. 5.

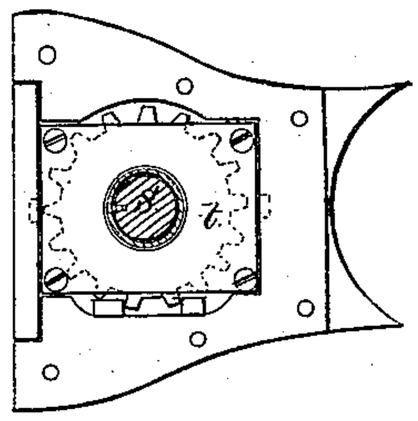

Fig. 1.

Witnesses.

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Sheet 2-2Sheet

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Rock Drills.

No. 100,252. Patented Mar. 1 1870.

Fig. 6.

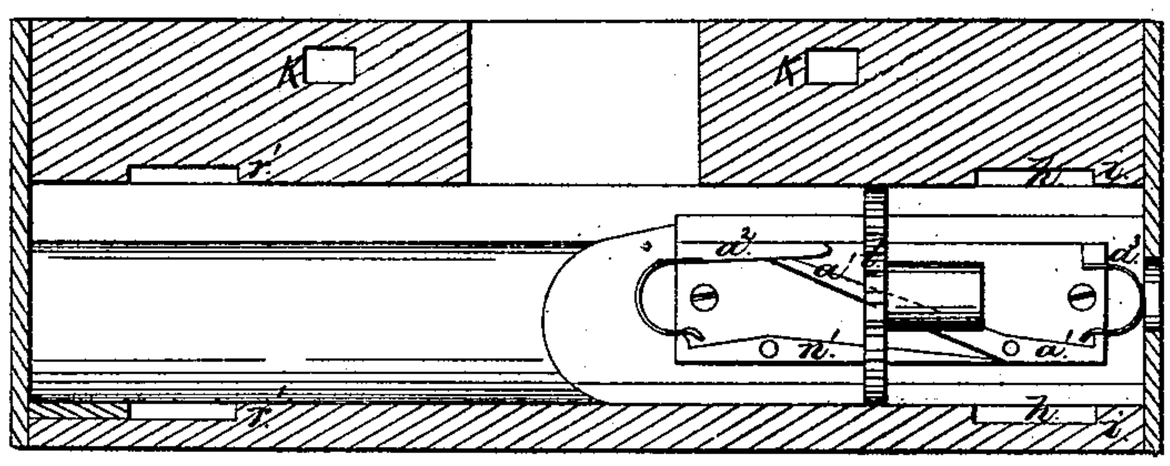


Fig. 7.

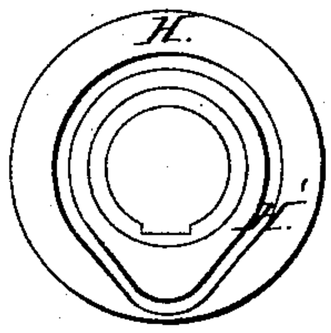


Fig. 8.

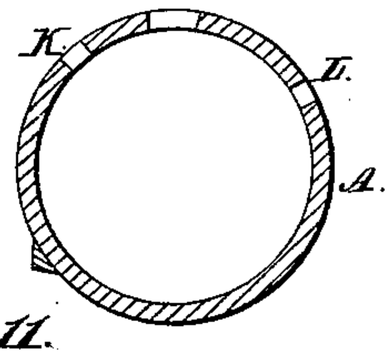


Fig. 12.

Fig. 11.

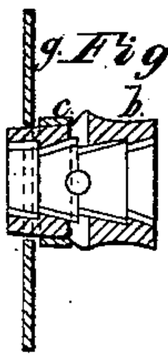


Fig. 17.

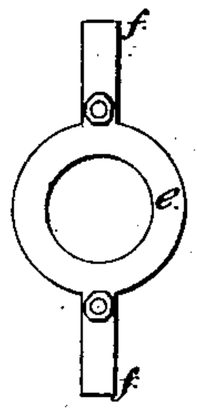


Fig. 9.

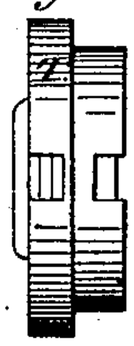


Fig. 10.

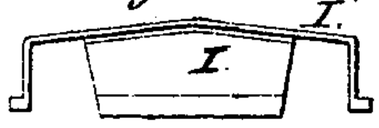


Fig. 13.

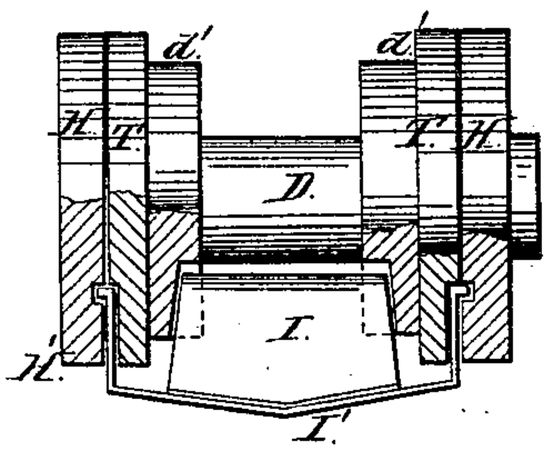


Fig. 14.

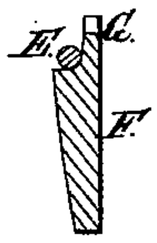


Fig. 15.

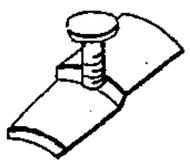
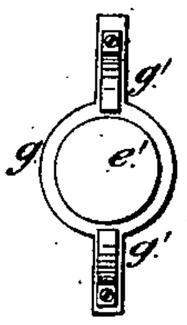


Fig. 16.



Witnesses.
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United States Patent Office.

A. BLATCHLY, OF CENTRAL CITY, COLORADO.

Letters Patent No. 100,252, *dated March* 1, 1870.

IMPROVED ROCK-DRILL.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, A. BLATCHLY, of Central City, and in the Territory of Colorado, have invented a new and improved Rock-Drill; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings forming part of this specification.

This invention relates to improvements in rock-drilling machines, designed to provide an automatically feeding drill, to be actuated by steam power, under a more simple and reliable arrangement than now in use.

The invention consists in certain improvements in the construction of the rotary engines for operating the drill, relating to the valve mechanism, pistons, bridge, or dividing-plates, and to packing the cylinders.

Also, in the combination therewith of a cam-wheel of peculiar construction for communicating a reciprocating movement to the drill-carriage.

Also, in an arrangement for disconnecting the propelling action of the cams with the drill-carriage previous to the blow of the drill.

Also in an arrangement of feed mechanism for the drill, whereby automatic feed is effected;

Also, in an arrangement for imparting an intermittent rotary motion to the drill; and

Also, in an arrangement for disconnecting the feeding mechanism for returning the drill after it has been fed out for the commencement of a new hole; and

Also in an arrangement for rotating the disk.

Figure 1 represents a side elevation of my improved machine;

Figure 2 represents a longitudinal section of the same;

Figure 3 represents a longitudinal section of the drill-carriage, showing the automatic feeding-devices;

Figure 4 represents a transverse section of fig. 3, taken on the line *x x*; and

Figure 5 represents a plan of the end of the drill-carriage.

Figure 6, Sheet II, is a central longitudinal section of the bed on which the cylinders rest, and which is recessed to receive the drill-carriage, the same showing the levers and cog-wheel, whereby the drill is rotated.

Figure 7 of said sheet is a face view of one of the cam-grooved disks, arranged at the outer ends of the cylinders.

Figure 8 is a transverse vertical section of the shell of one of the cylinders.

Figure 9 is an edge view of one of the end pieces of the cylinders.

Figure 10 is a plan view of one of the dividing-plates.

Figure 11, Sheet II, represents the inner side of one of the conical spring clamping-jaws, for holding and operating the drill-rod, the spring and clamping-plate being shown in section.

Figure 12, Sheet II, is a perspective view of one of the clamping-jaws and its screw, which are arranged on or near the end of the drill-rod, opposite that on which the conical clamps are placed.

Figure 13, Sheet I, is a side view of the arrangement of parts within each of the cylinders part being broken away, to show the connection.

Figure 14, Sheet I, is a transverse vertical section of one of the pistons, and the rod against which their inner ends abut.

Figure 15, Sheet I, is a perspective view of one of the conical clamping-jaws.

Figure 16, Sheet I, is a face view of the clamping-plate and its springs.

Figure 17, Sheet I, is a face view of one of the two rings, between which one of the sets of clamping-jaws is held.

Similar letters of reference indicate corresponding parts.

I employ a double rotary engine, of which A A′ are the cylinders for imparting rotary motion to the cam-wheel B, which imparts reciprocating motion to the drill-carriage C.

For economy of construction, I form the engine-bed into a casing for the drill-carriage.

The cylinders A A′ are fixed to the bed in a concavity, and from the said concavity an opening is made through the bed into the chamber, for the cam-wheel to work through for contact with the drill-carriage.

I make the shaft D of the engine hollow, and provide therein a rod, E, running from end to end, by which the ends of the cylinders are kept packed.

F represents the pistons, which are arranged in slots in the shaft, opening into the tubular space therein, and they are provided with springs G, or other equivalent device arranged to force them out against the cylinders.

These pistons are rebated at their bases or inner ends, as shown in fig. 14, to afford a recess for the reception of the rod E.

The effect of the spring G is that of a packing for the outer ends of the pistons, which are constantly in contact with the inner surface of the cylinder, during their revolution with the shaft D and wheel B.

The ends T of the cylinders are concave, and the sides of the pistons fitted thereto, so that no matter how much they wear, the pistons will always fit.

The ends T are rebated at their inner edges *d′*, so as to receive the shell of the cylinder.

H, (see fig. 7,) represents disks, applied to each end

of the shaft, and rotating with it, having cam-grooves H′, which, in conjunction with the corresponding grooves, cam-grooves H², in the hub of the wheel B, move the bridges or dividing-plates I into and out of the path of the pistons, for preventing the passage of the steam from the induction-ports K to the exhausts L, the motion being communicated by the yokes I′, connected to the dividing-plates, and so bent that their ends project into the grooves H of the plates and the grooves H² of the hubs respectively.

M represents the valve-chest of a common slide-valve, for admitting steam to the ports K.

The said valve is operated by a vibrating arm, N, deriving motion from the cam-groove *o*, on the interior of the rim of the wheel B.

The connection between said groove and arm is established by means of a rod or bar, *c*, which has a right-angled end, fitting in the groove, and is provided at its opposite end with a stud or pin working in a slot in the arm N.

The valve-rod *e′* is similarly connected to the lower end of said arm.

On the face of the cam-wheel are cam-projections P, into which studs *u u* on the drill-carriage take, and by which the motion is imparted to the carriage.

These cams are so formed that a stroke longer than the face of the wheel may be imparted to the drill-carriage.

They are also so formed that the connection between the wheel and the carriage is broken at the moment the blow of the drill is struck.

This is accomplished by so curving the projections that just previous to the contact of the drill, they recede slightly and allow the drill to continue for a slight distance by its momentum.

The drill-rod S is provided with a series of annular grooves, so formed as to resemble conical sections superposed upon one another, with the bases upward, and by these grooves the drill is suspended by two sets of spring jaws *a* and *b*. (See figs. 3 and 15, Sheet I, and fig. 12, Sheet II.)

These spring jaws are made in three or any other preferred number of pieces, having faces fitted to the configuration of the drill, and they are confined to the drill-shank by elastic springs *c*, or bands of elastic material.

The set *a* are suspended between a pair of rings *d e*, (see figs. 3 and 17, Sheet I,) clamped together by means of screw-threaded bolts and nuts, and capable of rising and falling to some extent in a hollow space in one end of the drill-carriage. They are also provided with lateral arms *f*, projecting through slots in the walls of the drill-carriage.

The set *b* of clamping-jaws, (see figs. 3 and 15, Sheet I, and fig. 11, Sheet II,) are tapered at one end, and fitted to work into the eye *e′* of a clamping-plate, *g*, (see fig. 19, Sheet II,) having two arms projecting into slots in the walls of the casing, as shown at *h*, fig. 2, just previous to the blow of the drill, whereby the plate is forced back upon the conical jaws, clamping them rapidly to the stem of the drill S, to hold it during the delivery of the blow.

The enlarged ends of the said jaws impart the blow to the drill by the action of the shoulder *k* of the carriage thereon.

After the blow is struck, the plate *g* is forced away from the conical jaws by the springs *g′*.

Before the blow is delivered the arms *f* of the plate *d* are arrested in their movement with the drill-rod, by striking against ledges or shoulder formed in the walls of the casing, and which causes the arrest of the jaws *a*, and they are, therefore, expanded by the force of the drill, and the latter caused to pass through the distance of one notch. On the return movement of the drill-carriage, the arms of the plate *e* are also arrested at a point sufficiently in advance of that where the drill-carriage stops to force the drill-shank through the jaws *b* the distance of one notch.

It will thus be seen that the office of the tapered jaws *b* is to form shoulders or bearing-surfaces for the shoulders K of the drill-carriage, while the office of jaws *a* is merely to feed the drill.

The jaws *b* are designed to enter the eye *e* of the plate *g* when or an instant before the blow is struck. Without the aid of this plate the jaws *b* would not bear evenly and firmly on the bases of the cones, in which case, owing to the heavy shock, the outer portions of said bases or shoulders of the cones would be liable to be split or broken off. Other damages might also be caused by the want of this plate, which it is unnecessary to detail.

If the rock being drilled should be so hard that the drill is unable to move the distance of one of the cones or conical sections, there will, of course, be no "feed," as the jaws *a* do not in that case move back that distance. The "feed" will therefore be effected when the movement of the drill has been repeated often enough to penetrate the rock the distance of one of the conical sections. The latter may be of any preferred length.

For the purpose of opening the jaws to return the drill after it has been fed out, they are connected by screws *l* to cam-rings *m*, by passing through slots therein, and these cam-rings are connected to a bar, *n*, for oscillating them in the direction, to cause the heads of the screws to ride up the inclines on the cam-rings, and thereby draw the jaws outwardly to open them sufficiently to permit the drill-shank to pass freely through them.

The bar *n* is operated by a key, *q*, and crank *p*.

The cam-rings may be operated by other equivalent devices.

For turning the drill, it is provided with a toothed wheel, *t*, which has a spline-connection with the drill. As the latter is moved out, one of the teeth of the wheel will ride along the under side of the inclined and pivoted spring-lever a^1, thus turning the same, and with it the drill. On the return movement of the latter, the levers a^1 and *n′* will both be embraced between two of the teeth of the wheel, but so soon as the end of the long arm of the lever a^1 is reached, another tooth of the wheel comes in contact with the under side of the fixed projection or rib a^2, and the same is again ready to make its forward movement.

The end X of the drill-carriage may be weighted by rings *y*, placed thereon, and between the said rings an elastic collar, Z, may be employed for tempering the shock against the carriage.

Having thus described my invention,

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

1. The combination with the cylinders and wheel B, provided with grooves H² of the rotary cam disks H, yokes I, and bridges, when arranged substantially as specified.

2. The arrangement of the hollow shaft D, packing-rod E, cylinder-head and cam-wheel, substantially as specified

3. The arrangement of the hollow shaft, tapered pistons F, concave piston-heads and springs G, substantially as specified.

4. The combination with the drill-carriage, having projections *u* of the cam-projections P, when the latter are formed to discontinue their action upon the carriage previous to the blow of the drill, substantially as specified.

5. The combination with the drill-shank, provided with grooves, as specified, of the spring clamping-

jaws *b*, and clamping-ring *g*, when arranged to clamp and release the said jaws, substantially as specified.

6. The arrangement of the shoulder K of the drill-carriage and clamping-jaws, substantially as specified.

7. The combination with the drill-shank of the feeding-jaws *a*, when arranged substantially as specified.

8. The combination with the drill-shank of the holding-jaws *b* and feeding-jaws *a*, arranged substantially as specified.

9. The combination with the holding and feeding-jaws of the cam-rings, pins, and jaws *l*, substantially as specified.

10. The combination with the cam-rings *m*, of the bar *n*, crank *p*, and key *q*, all substantially as specified.

11. The combination with the drill-shank of the toothed-wheel *t*, projection a^2, and spring-lever a^1, all arranged substantially as specified.

Witnesses: A. BLATCHLY.

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HENRY S. TAPPAN.