C. BURLEIGH.

Rock-Drill.

No. 162,528. Patented April 27, 1875.

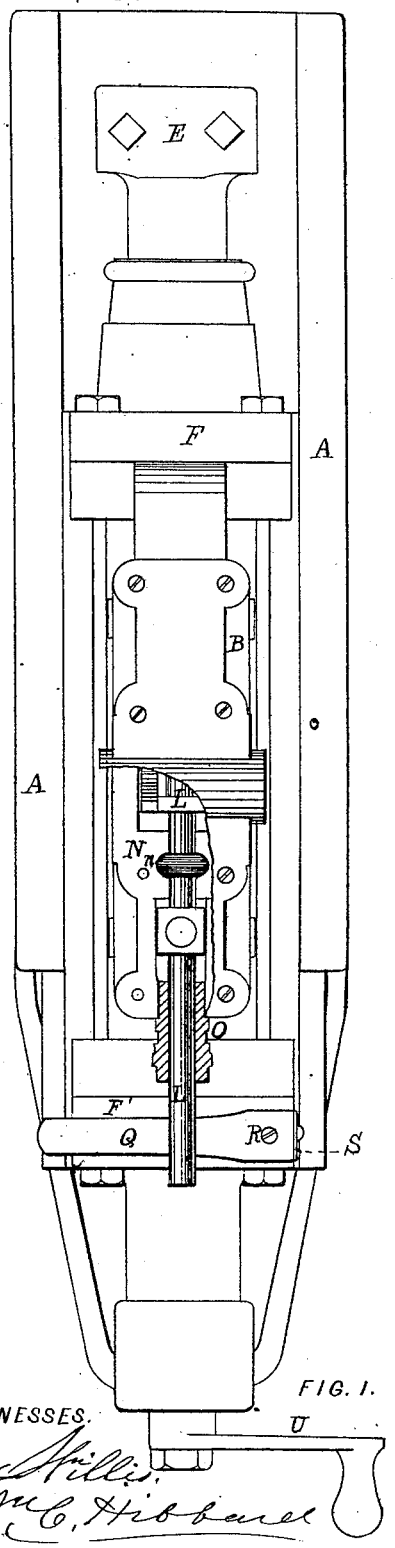

FIG. 1.

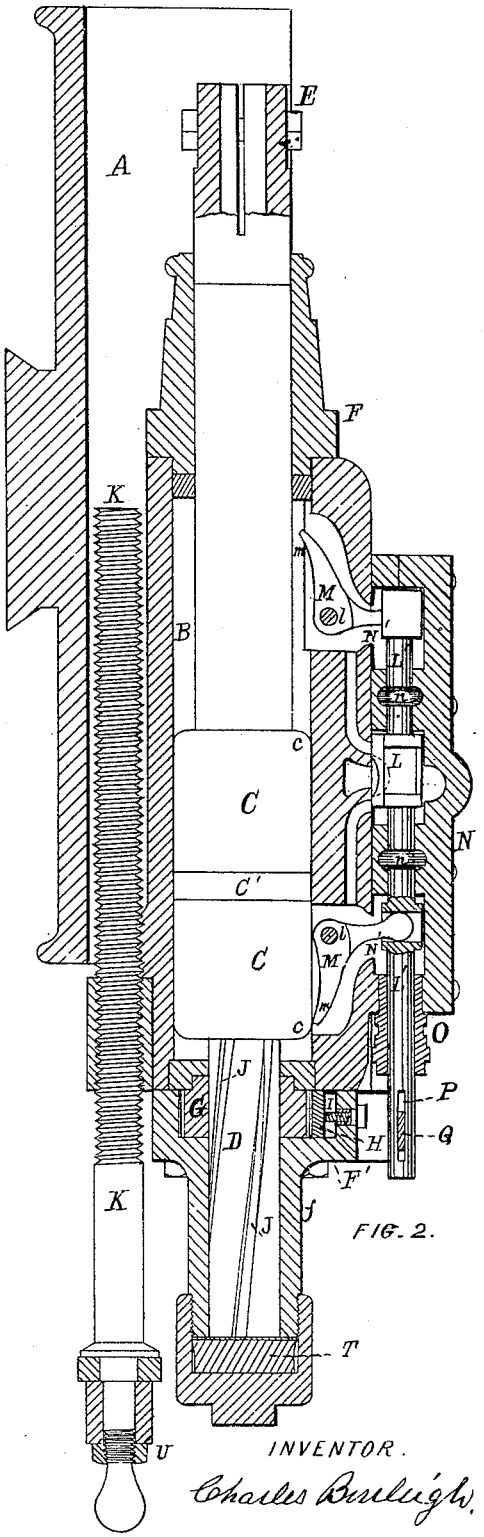

FIG. 2.

WITNESSES.

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CHARLES BURLEIGH, OF FITCHBURG, MASSACHUSETTS.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **162,528**, dated April 27, 1875; application filed April 28, 1874.

To all whom it may concern:

Be it known that I, CHARLES BURLEIGH, of Fitchburg, in the county of Worcester and State of Massachusetts, have invented certain Improvements in Rock-Drills, of which the following is a specification:

My inventions relate to the construction and arrangement of several of the subordinate parts of a rock-drill, having the general mode of operation of the drill patented to me November 27, 1866, No. 59,060, by which the machine is made very simple and compact, and better adapted to work in confined spaces and for drilling small holes, as in mining galleries, and which, for distinction, I call a "stoping" drill.

The first part of my invention relates to the manner of constructing and arranging the mechanism for working the valve which admits the steam or air to the piston, and consists in forming the steam or air passages at each end of the cylinder so as to receive the levers within them which move the valve, and, in combination therewith, the arrangement of the annular cams which operate said levers upon the ends of a long piston-head, so that the mechanism for moving the valve is inclosed within the air-passages.

The second part of my invention relates to the manner of constructing and arranging the back cylinder-head, in relation to the other parts of the machine, by which the machine is considerably shortened as compared with the machine shown and described in my aforesaid patent No. 59,960, while retaining an equal length of the stroke, and of the wearing-surfaces of the piston-bar, and consists in forming the back cylinder-head with a closed bearing for the back end of the piston-bar and a recess for the turning-ratchet, so that no part of the operative mechanism passes through it.

The third part of my invention relates to the construction of the valve mechanism so that it may be operated by hand when necessary, which will be described.

In the drawings, Figure 1 is a plan of my machine with a part in section to show the construction of the valve-mechanism; and Fig. 2 is a sectional elevation through the center of the machine. A is the frame or bed-plate of the machine. B is the cylinder; C, the piston; D, the piston-bar; E, the drill-chuck; F, the front cylinder-head; F′, the back cylinder-head; G, the turning-ratchet; H, the pawl for the same; I, the spring which holds the pawl to the ratchet, J J, the helical grooves in the piston-bar, by which the drill and piston, and parts connected there with, are turned; and K is the feeding-screw, by which the drill is fed forward.

The mode of operation of these parts is substantially the same as that of the corresponding parts as described in my aforesaid patent No. 59,960, with certain modifications of construction, which will be hereafter more particularly described. L is the valve which admits the air or steam to the piston, and L′ is the valve-rod. M M are two bent levers for working the valve by means of the annular cam-surfaces *c c* upon the ends of the piston. These levers are placed in the passages or ports which conduct the air from the valve into and out of the cylinder and work upon the axes *l*. The outer arms of the levers work in suitable bearings in the valve-rod L′, as shown, near each end; and the inner ends *m m* of the levers are made in the form of curved inclines, which project within the bore of the cylinder near each end, when the valve is at that end of its stroke so that as the piston moves to that end of the cylinder the rounded end of the piston comes in contact with it and pushes it laterally outward, which throws the valve to the opposite end of its stroke, and opens the port, and by the same action moves the other lever so that its inner end will project within the cylinder in the same manner. The valve L works in the central compartment of the valve-casing N, in the usual way, and in the two outer compartments N′ the levers M work, and connect with each end of the valve-rod, as is shown. Where the valve-rod passes through the partitions between the compartments, the joints are made tight by packing at *n*, for which recesses are made in the metal to receive it, as shown; or the joint around the valve-rod may be made tight in any other suitable manner. The outer compartments of the valve-casing are in direct connection with the cylinder-ports. The back end of the valve-

rod extends through a stuffing-box, O, and its outer end is provided with a slot, P, through which the lever Q passes, as seen more clearly in Fig. 2. This lever has its fulcrum at R, and is held in a central position by a leaf-spring, S, which bears against the square end of it, as shown. The slot P is made of sufficient length to permit the valve-rod to move its entire stroke without the ends of the slot coming in contact with the lever. The purpose of this lever Q is to work the valve by hand to start the machine in an obvious manner. The piston-head C is made long and has the packing-ring C′ at the middle, and each end of the same, *c c*, is made long enough to reach past the acting faces of the levers M, while the packing-ring remains uncovered by the port or opening in the cylinder in which the levers M work. The ends *c c* of the piston-head are rounded so as to work properly with the levers M, in substantially the same way that the annular cam or projection works, which is shown and described in my aforesaid patent No. 59,960. The back end of the piston-bar D works in a long bearing, *f*, that is formed upon the back cylinder-head F′, as shown, and fits nicely therein. In the surface of the rod are formed four helical grooves in which two splines work, which are fixed in the ratchet G, upon opposite sides of the piston-bar. This arrangement of the ratchet and splines and helical grooves operates in the same way as in my aforesaid patent. The other two helical grooves are similar to these, and serve as ports to admit the air or steam to the back end of the piston-bar, and when the other grooves are too much worn for use these two grooves may be brought into use instead, and the other grooves serve as ports. As this part of the machine is subject to much wear, this construction gives it twice the durability. Six or more grooves might be used in the same way, but this would probably remove too much of the outside bearing surface of the piston-bar, but I have tried four grooves with perfect success. T is a buffer of india-rubber to cushion the backward stroke of the piston-bar.

By this arrangment all the operative parts of the machine are entirely inclosed within the casing of the machine, excepting the working end of the drill-bar, to which the drill is attached, and the pressure of the air or steam is exerted upon the entire area of the piston at the back end, while the bearing at the back end of the piston-bar is preserved and made very efficient, which is a matter of much importance in drilling horizontally, where the extended drill is supported entirely by the piston-bar, and without the back bearing the piston and bore of the cylinder will be very soon worn out of shape. In the drawings the machine shown is fed forward by the hand of the operator, by means of the crank U, upon the feeding-screw K.

The operation of the machine is believed to be obvious without further description of it.

What I claim is—

1. The combination of the bent levers M, with the annular cam-surfaces *c c* on the piston, said levers moving laterally thereto, as described, and the valve, where said levers are arranged within the air-passages which lead from the valve into the cylinder, substantially as described.

2. The closed back cylinder head formed with a closed bearing for the back end of the piston-bar, and a recess for the turning-ratchet, constructed and operating substantially as described.

3. The lever Q provided with a spring, S, to hold the same in a central position in combination with the valve-rod having an elongated slot P, substantially as described.

CHARLES BURLEIGH.

Witnesses:

H. A. WILLIS,

WM. C. HIBBARD.