E. S. WINCHESTER.
Rock-Drills.

No. 208,448. Patented Sept. 24, 1878.

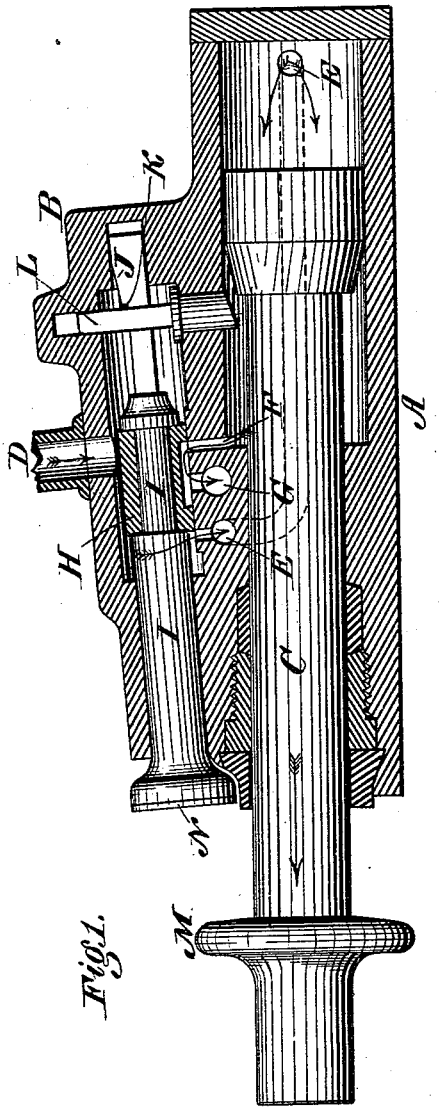

Fig. 1.

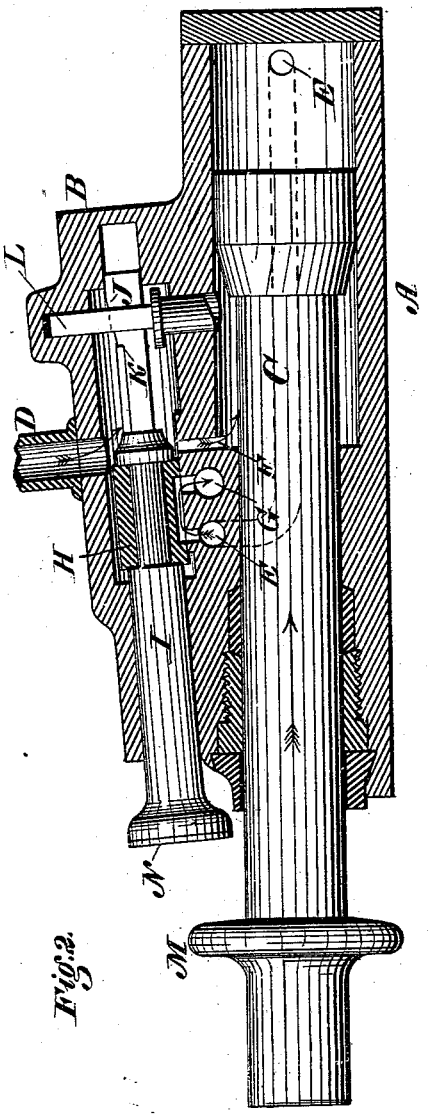

Fig. 2.

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UNITED STATES PATENT OFFICE.

EDWARD S. WINCHESTER, OF SOUTH BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **208,448**, dated September 24, 1878; application filed March 22, 1878.

To all whom it may concern:

Be it known that I, EDWARD S. WINCHESTER, of South Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Rock-Drills, of which the following is a specification:

My invention relates to an improved arrangement of mechanism for operating the sliding valve of a rock-drill, whereby the movement of the valve in one direction is effected by the pressure of the air or steam thereon, and in the other direction by the direct action of the main piston, as hereinafter more fully described; and, also, in a peculiar arrangement of the ports to facilitate the escape of water from the cylinder.

Figure 1 represents a central longitudinal section through a drill provided with my improvement, the parts being shown in the position which they occupy during the downward movement or stroke of the piston. Fig. 2 represents a similar view, with the parts in the position which they occupy during the inward movement or ascent of the piston.

A represents the main cylinder, provided on one side with a steam or valve chest, B, and containing the sliding piston C. The piston is arranged to play downward at one end through the stuffing-box or gland in the lower end of the cylinder, and is provided at the inner or upper end with an enlarged head and at the lower or outer end with a tool-socket, as usual. The valve-chest B receives steam or compressed air through the pipe D, and communicates with the interior of the cylinder by two ports or passages, E F, the former leading into the upper end of the cylinder above the piston-head, and the latter into the lower end of the cylinder below the piston-head. An exhaust-port, G, also communicates with the interior of the valve-chest between the mouths of the ports E F, as shown.

H represents a sliding valve, mounted in the valve-chest and arranged to slide over the faces of the ports, the valve being constructed in the same manner as the common and well-known D-valve in ordinary use, or of any other suitable form, provided that it serves to admit steam through the two ports E F alternately into the cylinder, and to connect each of said ports with the exhaust-port while steam is being admitted through the other.

I represents a valve stem or spindle, connected to the valve, and extending downward at one end through the chest B into the open air, while at the other end it is provided, within the chest, with an inclined head, J, having a shoulder, K, at its inner end.

L represents a sliding bolt or detent, through which the head J of the valve-stem passes, and which has its inner end extended through an opening into the side of the cylinder A, in such position as to be acted upon by the piston-head as the latter completes its downward or outward stroke, the end of the bolt and the edge of the piston-head being beveled in the manner shown, so that as the head descends it forces the bolt downward or upward over the cylinder. The bolt is mortised to admit of the valve-stem passing through it, and is so constructed that, upon being forced downward or inward at the time the valve-stem is drawn back, it will engage over the shoulder K of the stem in the manner represented in Fig. 1, and prevent the valve from moving outward, the bolt at such time protruding into the cylinder, as shown.

The outer end or head of the piston-rod is provided with an annular flange, M, which strikes against the end of the valve-stem and forces the same upward with the valve as the piston completes its upward or inward stroke.

Steam being admitted into the valve-chest, the operation of the parts is as follows: Supposing the valve-stem to be moved upward and retained by the bolt L, as in Fig. 1, steam will enter through the port E into the upper end of the cylinder and force the piston downward, while at the same time the steam below the piston-head will escape through the port F and the valve into the exhaust-port G. As the piston completes its downward stroke its head acts against and raises the bolt L, causing the same to become disengaged with the shoulder K on the valve-stem and release the same, whereupon the steam pressing against the inner end of the stem forces the same outward, thereby moving the valve into the position shown in Fig. 2, so as to admit steam through the port F under the head of the pis-

ton, and permit the steam to escape through the port E and valve into the exhaust-port, the effect of which is to cause the piston to move inward or upward. As the upward movement is completed the flange M, striking against the outer end of the valve-stem, forces the same inward, causing the parts to again assume the position shown in Fig. 1, in which position they are retained by the engagement of the bolt L with the shoulder K, the bolt being forced downward and caused to engage by the pressure of the steam, the upper end of the bolt being reduced in size and inserted into the cavity in the top of the valve-chest, as shown, so that the steam exerts a greater pressure downward than upward upon it. In order to prevent the excessive shock or concussion when the flange of the piston-rod strikes upon the valve-stem, the latter is provided at its outer end with a rubber cushion, N, applied in the manner shown.

By the above-described construction and arrangement of parts I produce a drill which is exceedingly simple and strong, the valves of which operate with certainty and accuracy, and which may be run at the highest rate of speed desirable without injury to any of its parts.

In drill-cylinders as ordinarily constructed it frequently happens that great difficulty is experienced on account of the accumulation of water in the cylinder. In order to permit the free escape of this water, the lower port, F, or port from the lower end of the cylinder, is extended directly outward, and the port E from the upper end of the cylinder extended downward below the mouth of port F, as shown in the drawings. It will be seen that under this arrangement the water is permitted to flow freely from both ends of the cylinder, and that the accumulation or confinement of water below the piston during the downstroke is effectually prevented. It will, of course, be understood that the free flow of the water from the cylinder, and especially from the lower end, only occurs when the cylinder lies on its side or stands in a substantially vertical position, in which position it is mainly used.

Having thus described my invention, what I claim is—

1. In a rock-drill, the combination of the piston C, the sliding valve having its stem extended at one end to be acted upon by the piston, and provided at the inner end with a shoulder, K, in combination with the bolt or detent L, said parts being constructed and arranged to operate substantially as described.

2. The combination of the cylinder A, provided with ports E F G, piston C, having shoulder M, valve H, spindle I, having shoulder K, and detent L, substantially as and for the purpose set forth.

3. In a rock-drill, a sliding valve arranged to be moved in one direction by the positive action of the piston, and in the other by the pressure of the steam, in combination with a detent arranged to hold the valve when forced back against the pressure of the steam, and to be released by the action of the piston-head, substantially as shown and described.

4. In combination with the cylinder and valve, the port F, opening directly into the lower end of the cylinder, and the port E, extending from the top of the cylinder downward to a point below the mouth of port F, as and for the purpose described.

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Witnesses:

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