

S. Grinn,
Steam Rock-Drill.

No 44,862.

Patented Nov. 1, 1864.

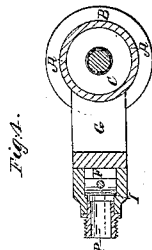
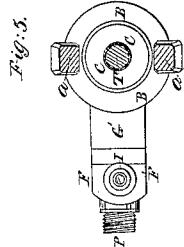
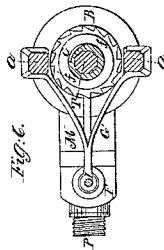
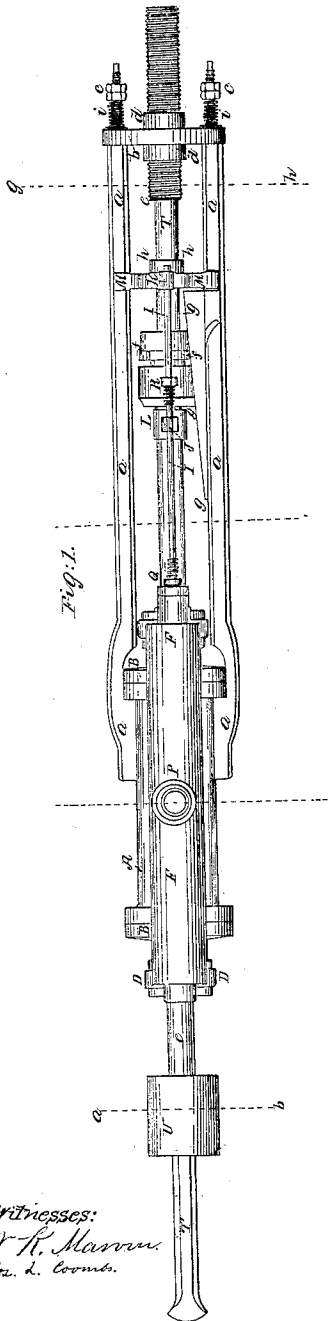
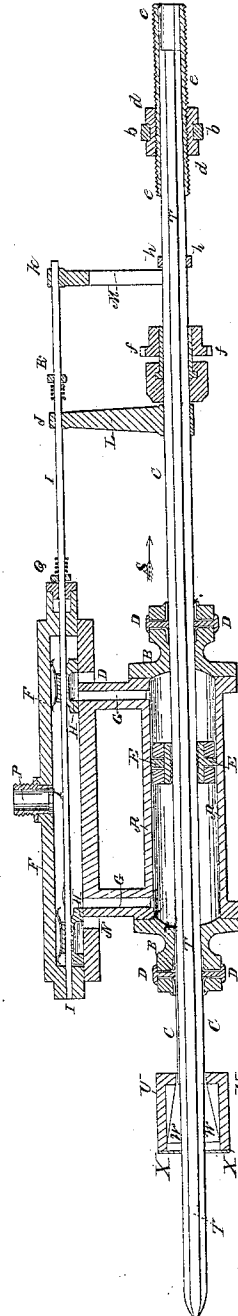


Fig. 2.



Witnesses:
W. H. Mason
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by J. F. Little
Witness.

UNITED STATES PATENT OFFICE.

STUART GWYNN, OF NEW YORK, N. Y.

IMPROVEMENT IN PNEUMATIC DRILLS.

Specification forming part of Letters Patent No. 44,862, dated November 1, 1864.

To all whom it may concern:

Be it known that I, STUART GWYNN, of New York, in the county and State of New York, have invented certain new and useful Improvements in Pneumatic Drills; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view, and Fig. 2 a sectional elevation, of my improved pneumatic drill; and Figs. 3, 4, 5, and 6 transverse sections according to lines *a b*, *c d*, *e f*, and *g h* in Fig. 1.

This invention relates to an apparatus or means for mechanically drilling holes into rocks for the purpose of blasting the same, and for other purposes; and it consists in the combination, with a drill, of suitable machinery, whereby it may be operated by direct action of steam or other elastic fluid, substantially as hereinafter described; also, in the employment, in machines for drilling rocks by means of steam or compressed air, of a hollow piston-rod to contain the drill or tool or the drill or tool holder; also, in the combination in one machine of the following elements: first, a cylinder, piston, and hollow piston-rod, the latter containing the drill or drill-holder; second, a feed mechanism to cause the tool or tool-holder to advance as the work progresses; third, a mechanism for rotating the drill during its operation.

To enable others to make and use my invention, I shall now proceed to describe the manner in which the same is or may be carried into effect, and referring to the drawings—

A is the cylinder arranged for pneumatic action—that is to say, for operation by compressed air. It is provided at either end thereof with a head, B, through which passes the hollow piston-rod C. The packing in the heads is composed of two annular disks of leather bent into the form of a cup and confined in their places by means of a flanged ring, D, or otherwise. The hollow piston-rod is screwed at about the middle into the piston E, which is composed of a metal body cast with a central flange and of two rings, which confine two cup-leathers. This mode of packing, although not suitable for steam, is very efficient in machinery operated by compressed air. At one side or on top of the cylinder

there is a valve-chest, F, communicating with the cylinder by means of two ports or tubes, G. Two independent cup-valves, H, arranged within the valve-chest, and playing on the valve race or seat, are connected by means of a rod, I, passing through stuffing-boxes at both ends of the chest and through eyes or guides J and K in the ends of the movable and stationary brackets L and M. At N and O in the valve-chest are orifices through which the exhaust or escape of the air which shall have performed its work takes place. The air is entered the valve-chest by means of an induction-pipe connected with the screw-pipe P in the center, or thereabout of the chest.

To the valve-rod, and on either side of the bracket L, are secured two stops or tappets, Q and R, by means of which the valve is operated directly from the piston; and this is effected in the following manner: To the piston-rod, as before stated, is attached the arm or bracket L, which partakes of the reciprocating movement of the piston. This bracket freely slides on the valve-rod, which passes through the eye or orifice of the arm or bracket, as before described. The two stops or tappets, Q and R, are arranged in such relation to the course of the piston that one of them is struck by the arm L when the piston is about completing its stroke in either direction. The distance between the two stops, therefore, is somewhat less than the length of the cylinder, and the valve-cups are arranged upon the rods, so that while the air is entered into the cylinder through one port the air on the opposite side of the piston is exhausted through the other port.

In Fig. 2 of the accompanying drawings the valves are shown placed arranged for the reception of air into the cylinder through the port G and for exhaustion of the air through the port G' and the orifice O, the piston being supposed to travel in the direction of the arrow S. The lever L, just before the piston reaches the port G', strikes the stop R, and thus pushes the rod back, thereby shifting the valves so as to close the port G and open the port G'; on the other hand, open the exhaust N and close the exhaust O. As soon as the valves are shifted, the pressure on the piston is reversed, and the piston will then advance again, allowing the bracket freely to slide again on the valve-rod I until when

the piston shall have arrived at or nearly the port G it will strike the stop Q and again shift the valves, as before described. In this way the reciprocating motion of the piston is transmitted to the valves, which govern the inlet and outlet of the elastic fluid which operates the apparatus.

The hollow piston-rod contains the drill bar or tool T. This is an octagonal or other suitably-shaped bar, filling or nearly filling the interior of the hollow piston-rod. It is held in the piston-rod by means of a device which will allow the drill-bar or tool to advance as the work progresses, but not to recede. This device consists of a wedge-box, U, fast to the piston-rod, containing a series of wedges, W, the heads of which are toward the point of the drill, and the taper ends or points toward the piston.

I prefer to use as many wedges as there are sides to the drill-bar, so that each wedge may act on a side of the drill-bar and concentrically around it. The wedge-box may be lined with a hollow cone of a circular or polygonal surface to prevent the displacement of the wedges, and it may be closed at the forward end by means of a plate, X, having on its interior side, interposed between it and the heads of the wedges, a flatring made of vulcanized india-rubber.

The operation of this box is as follows: When the piston-rod with the drill-bar advances, supposing against a rock, the drill-bar striking it with all the expansive force of the steam or compressed air, the drill-bar on striking the rock or obstacle would slide back within the piston-rod but for the wedges, which will the more tightly and firmly grasp and hold the drill-bar the greater the blow, because of the wedges being compressed against the drill-bar and the conical interior surface of the box; but if the drill-bar be advanced without advancing the hollow piston-rod or by moving the drill-bar forward within the piston-rod, then the wedges will release their hold on the bar by sliding along the conical surface of the interior of the box, which they are enabled to do because of the compressible india-rubber cushion in front thereof.

The movement of the drill-bar within the hollow piston-rod is effected by the means and in the manner as follows: To the sides of the cylinder are secured, by means of bolts or otherwise, two standards, *a a'*, extending in lines parallel with the piston-rod and united at their extremities by means of a collar-brace, *b*, held in place by means of nuts *c*. The collar-brace *b* contains a female screw-nut, *d*, fastened into the collar by a sort of bayonet-catch, so that the nut *d* may be taken out, reversed, and put in at pleasure, according to the necessities of the work. Within

this female screw-nut works a hollow male screw, *e*, of suitable length, containing the drill-bar. The interior of the hollow screw is octagonal, in conformity with the drill-bar, or some other device may be adopted for the purpose of causing the drill-bar to rotate together with the screw, or vice versa, causing the screw to rotate together with the drill-bar. The hollow piston-rod before referred to is mounted on the rear end thereof by a ratchet-wheel, *f*, which, in its translatory movement coming in contact with the inclined plane or cam *g*, is caused to rotate on its center, which rotation is imparted to the drill-bar as well as to the screw *e* in the stationary nut *b*. The rotation of the screw in the stationary nut causes it to advance a fractional portion of the interval between the threads, which, by coming in contact with the fixed stop *h*, limits the back stroke of the drill-bar without interfering with the stroke of piston or piston-rod. In this way the drill-bar is advanced at every stroke of the apparatus, which is regulated so to do in accordance with the progress of the work.

To prevent jars or concussions which may affect the apparatus, I interpose between the movable tappet-bar or arm L and tappets or stops Q and R a small helical spring coiling around the valve-rod, so that when the arm travels to and fro between the stops it shall first compress the spring before striking the said stops, thus deaden the blow. A similar device is employed at the collar-brace, where a spiral spring, *i*, is interposed between it and the nut *c*.

Having thus described my invention and the manner in which the same is to be performed, I claim—

1. The employment, in machines for drilling rocks by means of steam or compressed air, of a hollow piston-rod to contain the drill or tool, or the drill or tool holder.

2. The combination in one machine of the following elements: first, a cylinder, piston, and hollow piston-rod, the latter containing the drill or drill-holder; second, a feed mechanism to cause the tool or tool-holder to advance as the work progresses; third, a mechanism for rotating the drill during its operation.

3. The combination, with a drill, of machinery whereby it may be operated by direct action of steam or other elastic fluid, substantially as herein described.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

STUART GWYNN.

Witnesses:

EDM. F. BROWN,
JOS. L. COOMBS.