

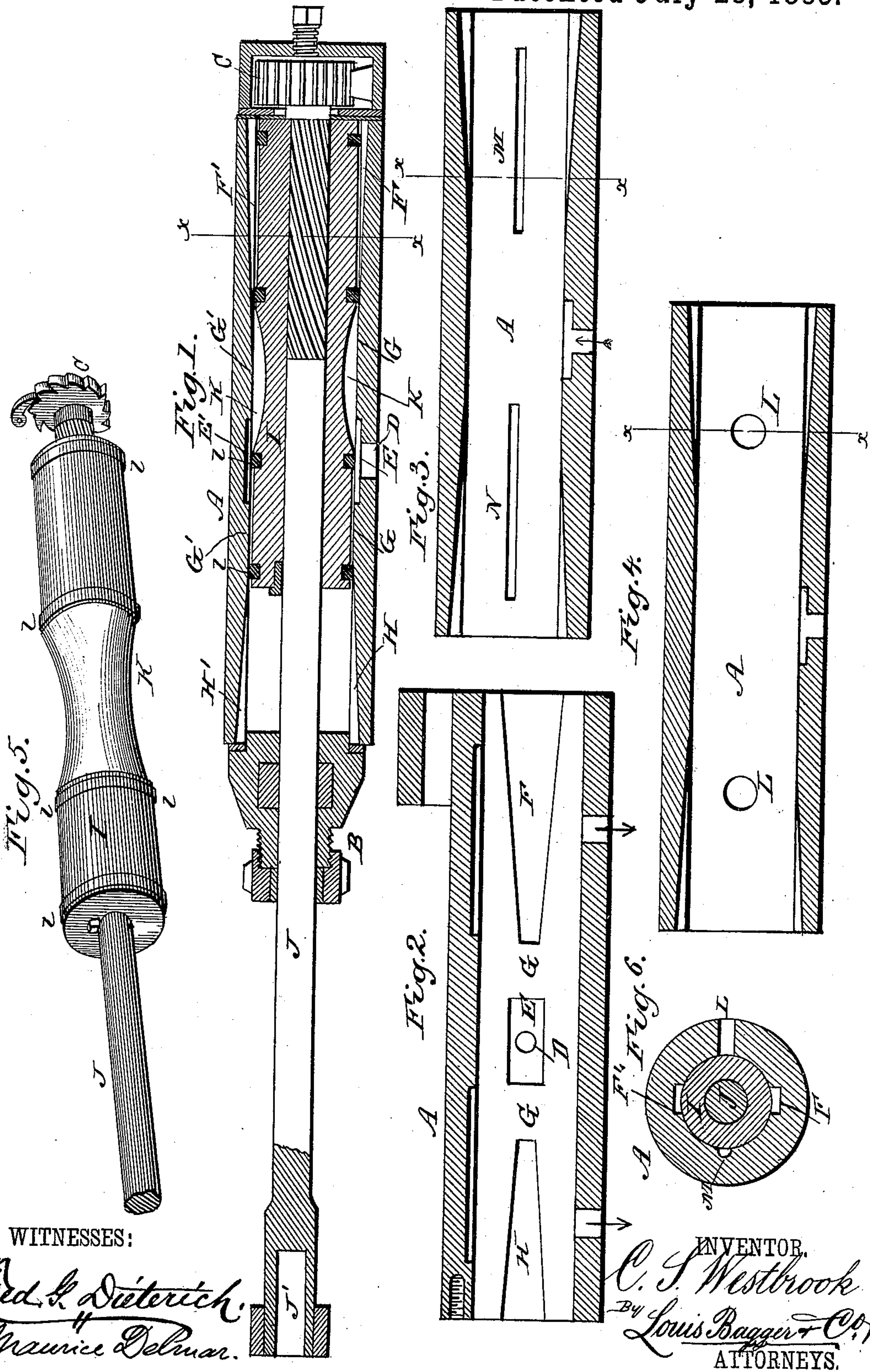
(No Model.)

C. S. WESTBROOK.

ROCK DRILL.

No. 323,245.

Patented July 28, 1885.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CHARLES S. WESTBROOK, OF SPRAGUEVILLE, NEW YORK.

## ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 323,245, dated July 28, 1885.

Application filed October 29, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES S. WESTBROOK, a citizen of the United States, and a resident of Spragueville, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Rock-Drills; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a longitudinal sectional view of my improved rock-drill. Fig. 2 is a similar view of the cylinder, taken through a plane at right angles to Fig. 1. Figs. 3 and 4 are similar views of opposite sides of the cylinder, the piston having been removed in the three last views. Fig. 5 is a perspective view of the piston removed from the cylinder, and Fig. 6 is a cross-section through line *x x*.

Like letters of reference indicate corresponding parts in all the figures.

This invention has relation to rock-drills operated by steam, compressed air, or any other suitable medium; and has for its object to simplify the construction of the drill and at the same time increase its efficiency.

To this end my invention consists in certain improvements in the construction of the drill-cylinder and piston, which will be hereinafter more fully described and claimed.

In the accompanying drawings, A denotes the cylinder, one head of which is provided with a stuffing-box, B, which may be of any desired construction. The other cylinder-head is preferably provided with the usual steep-threaded screw and ratchet, C, for imparting the required turn or rotation to the piston and drill; but any other suitable mechanism for revolving the drill-shaft may be employed if desired. The live-steam port D opens into one side of the cylinder, and a recess, E, is formed around said port on the inside. On the same side of the cylinder, and in a line with the inlet-port D and its recess E, is, on one side, a groove or channel, F, and on the other side a similar groove or channel, H, the said grooves or channels F and H being separated from the central recess E by the should-

ders G G, and extending from said shoulders to opposite ends of the cylinder. I prefer to construct these channels of gradually increasing width and depth from their inner toward their outer ends, substantially as and for the purpose described in my application for Letters Patent for improvements in rock-drills, filed June 16, 1884, Serial No. 135,034, and by preference the channel H, which extends toward the forward end of the cylinder, is made shorter and of less carrying capacity than the channel F, which extends to the rear end of the cylinder. On the opposite side of the cylinder, and registering with the open channels F and H, are two similarly-constructed channels, F' and H', separated from a recess, E', exactly opposite to the recess E, by shoulders or bridges G' G'; and in the inner walls of the cylinder, in a plane at right angles to a plane laid through the axis of the cylinder and through the middle of the duplicate flaring channels, are cut; on one side, two longitudinal narrow grooves or channels, M and N, and on the opposite side the two exhaust-ports L L. The reciprocating piston I has the drill-shaft J projecting from its forward end, and is provided with an annular recess, K, around its middle part, somewhat longer than the two opposite recesses E and E', so as to enable the annular recess in the body of the piston to bridge over the opposite shoulders, G G and G' G', and thus connect the recesses E and E' on opposite sides with either pair of channels, F F' or H H'. The body of the piston is provided on opposite sides of the said central recess with steam-tight expansible packing-rings l, of any desired construction.

From the foregoing description, taken in connection with the drawings, the operation of my invention will readily be understood. As steam or air is admitted into the cylinder through the inlet-port D, the recesses E and E' will connect the inlet-port through the recess in the piston with the inner ends of one of the pairs of grooves or channels F and F' or H and H', which will thus conduct the live steam or air to the space between the head of the cylinder and the appropriate head or end of the piston, allowing it to act against that end of the piston so as to force it away from the



head. Before reaching the end of the stroke the solid part of the piston will reach the shoulders between the inner end of the appropriate channels and the inlet-recesses, thus cutting off the connection between the same, while at the same time the solid end of the piston will uncover the appropriate exhaust-port, which allows the steam or air to escape; but at this point the annular recess in the piston will be in position to connect the recesses E and E' with the channels at the other end of the cylinder, admitting steam or compressed air to operate against that end of the piston, thus driving the piston in the opposite direction until, on the return stroke, it arrives at the point at which the solid part of the piston will shut off the connection between the recesses at and opposite to the inlet-port and the appropriate channels, at the same time uncovering the exhaust, whereupon the same operation is performed in the opposite direction, and so forth, as long as the drill is at work. A certain amount of steam or air will always at each stroke remain in the ends of the cylinder, which will be compressed by the piston at the next stroke in the opposite direction, and this steam or air, as the case may be, will serve as a cushion for the piston and prevent the same from striking the heads of the cylinder at the end of each stroke, and also serves, by expansion, in starting the piston on its return stroke, this pressure being sufficiently low not to weaken the force of the direct stroke of the piston.

It will be seen that by constructing the cylinder with the diametrically-opposite and registering recesses and channels the piston will be held in equilibrium in the cylinder between an even pressure on opposite sides; but there will be a lateral excess of pressure from the steam or compressed air in the narrow channels M and N, which, pressing against one side of the piston, operates to seat this closely against the exhaust side of the cylinder, so that no live steam or air can leak past the piston and through the exhaust-ports while the piston is making its stroke.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination, in a rock-drill, of the cylinder having the open recesses or passages F and F' and H and H', arranged longitudinally, diametrically opposite to one another, and the recessed piston balanced in the cylinder between said recesses, and having expansible packing-rings, whereby a steam-tight joint is formed between the heads of the piston and the solid inside part of the cylinder, substantially as set forth.

2. The combination, in a rock-drill, of the cylinder having at both ends of two of its opposite sides the open recesses or passages F and F' and H and H', arranged longitudinally and facing one another, and on its other two sides the exhaust-ports and the narrow longitudinal channels arranged opposite to the same, and the recessed piston having expansible packing-rings at each end of its solid heads on opposite sides of the recess, substantially as and for the purpose shown and set forth.

3. In a rock-drill, a cylinder constructed with an interiorly-recessed inlet-port on one side, two flaring recesses arranged longitudinally on opposite sides of the central recess, two corresponding flaring recesses on the diametrically-opposite side of the cylinder, a recess between the inner ends of said flaring recesses, the longitudinal steam grooves or channels cut in the inside of the cylinder in a plane at right angles to a plane laid longitudinally through the middle of the diametrically-opposite flaring recesses, and the exhaust-ports located diametrically-opposite to said narrow steam grooves or channels, substantially as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

CHARLES S. WESTBROOK.

Witnesses:

AUGUST PETERSON,  
ARTHUR L. MORSELL.