

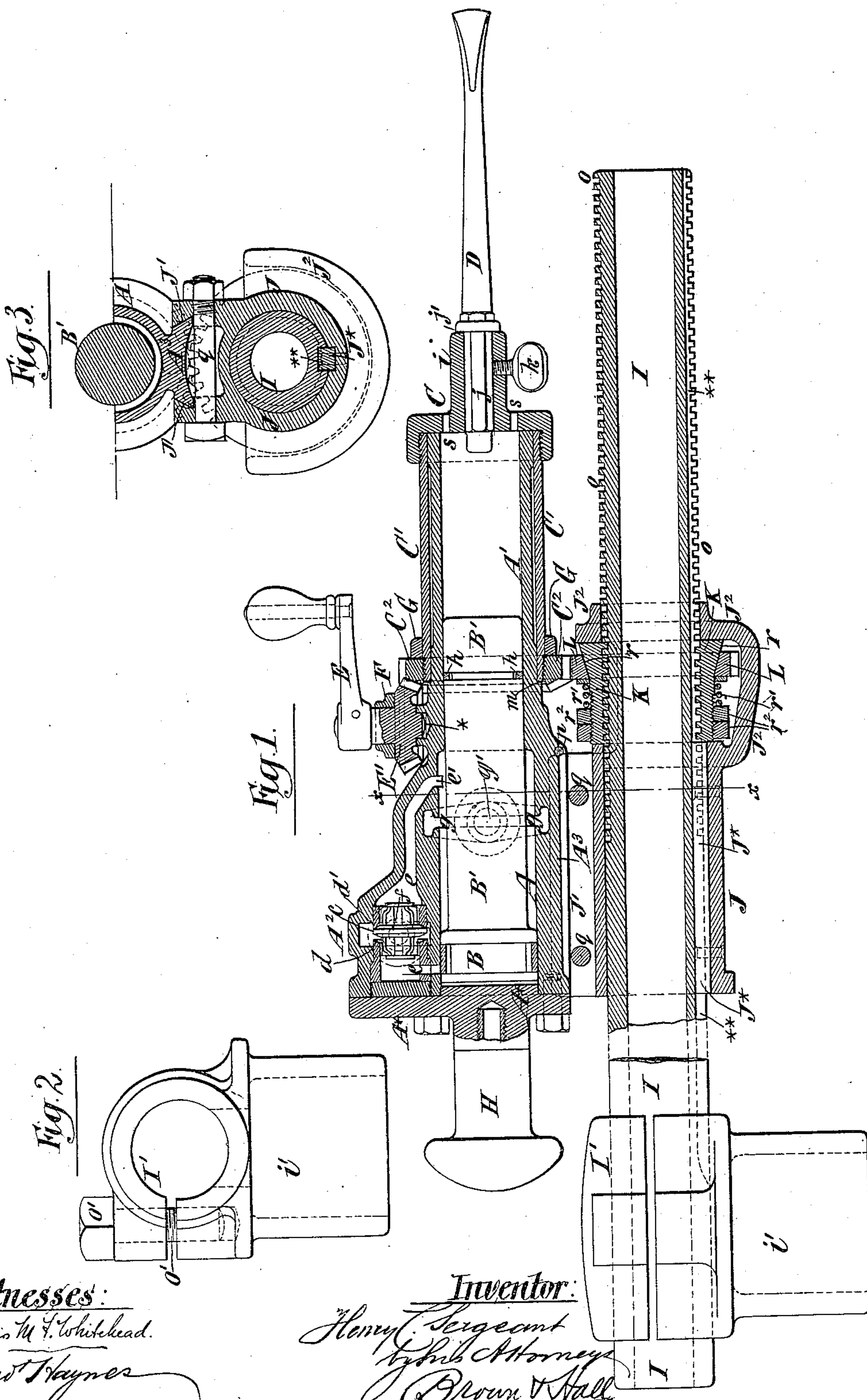
(No Model.)

H. C. SERGEANT.

ROCK DRILL.

No. 308,524.

Patented Nov. 25, 1884.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 308,524, dated November 25, 1884.

Application filed June 2, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY C. SERGEANT, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Rock-Drills and Supports Therefor, of which the following is a specification.

My invention relates to rock-drills comprising a cylinder and a piston reciprocated therein by steam or other motive fluid.

According to my present invention I employ a non-rotary bar, which may be securely held by a tripod, column, or other suitable support, and which is screw-threaded for a portion of its length. I also employ a sleeve, which may slide along the non-rotary bar, but which is locked against turning thereon, and to this sleeve the drill-cylinder is secured, so as to move with it. I also employ a nut, which is so connected with the said sleeve, and through it with the drill-cylinder, that by turning the nut in one or other direction on the screw-threaded non-rotary bar it will be made to traverse the same, and will thereby move the sleeve and drill forward to feed or backward to withdraw the drill from the rock. The rotation of the drill must of course be positive; but the feed must vary with the speed of drilling, owing to the quality of rock, the kind and sharpness of the drill used, and other circumstances.

In carrying out my invention I connect the aforesaid nut, which is fitted upon the non-rotary screw-threaded bar, with the devices for rotating the drill; but in order that the feed may automatically regulate itself I connect the said nut with the rotating devices by means of frictional engaging devices, whereby provision is afforded for rotating the drill positively and with a definite speed, while operating the feeding-nut with a speed or movement which is self-regulating or self-adjusting. Such provision for variable feeding is afforded by providing the nut with an externally-conical portion, on which is fitted a gear-wheel bored tapering to fit the conical seat on the nut and pressed thereon by a spring, the tension of which may be varied by a nut. When the maximum speed of rotation of said gear-wheel exceeds the speed of rotation of the nut which is necessary for proper feeding, the wheel will slip on the conical nut, and the pressure of the

drill upon the rock and the engagement of the wheel and nut form two opposing forces, the latter of which will always yield to the former.

The invention consists in combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings I have illustrated my invention as applied to a drill of the kind shown and described in my application for Letters Patent filed June 2, 1884, and of which the serial number is 133,465; but the invention is applicable to other kinds of drills.

Figure 1 is a vertical section of the drill, its non-rotary supporting and feeding bar, and a side view of a clamp in which the bar may be adjustably secured, and which is constructed for ready attachment to a tripod, column, or other ordinary form of drill-support. Fig. 2 is an end view of the said clamp; and Fig. 3 is a transverse section on the dotted line *x x*, showing only a portion of the drill-cylinder.

Similar letters of reference designate corresponding parts in all the figures.

I will first briefly describe the drill here chosen for purpose of illustration, and which forms the subject of my aforesaid application for Letters Patent.

The cylinder A is constructed with an extension, A', of slightly smaller diameter, and is closed at one end by a head, A\*, securely bolted thereto, and from which projects a hand-piece or breast-piece, H, whereby the drill may be held when operated without any support, as described in my said application.

B designates a piston fitting the cylinder, and provided with suitable packing-rings, and from the piston B there projects a piston-extension, B', of smaller size, fitting snugly the cylinder-extension A'. With the cylinder is cast a valve-chest, A<sup>2</sup>, closed at the end by a portion of the head A\*, and in which is a double puppet-valve, *c*, arranged to work between two seats, *d d'*, which it alternately closes, and thereby admits the motive fluid through ports and passages *e e'* alternately to opposite sides of the piston B. Steam, air, or other motive fluid enters the chest A<sup>2</sup> through an inlet-pipe *f*, (shown dotted in Fig. 1,) and between the ends of the cylinder A is an exhaust-port and belt, *g*, which is passed over and uncovered by the piston B, and from which leads a fluid-exhaust outlet, *g'*.



The valve and construction and arrangement of ports and passages, and the operation of the parts are fully described in my United States Letters Patent No. 295,682, granted 5 March 25, 1884, and a detailed description thereof is not therefore necessary. A valve of any other well-known or suitable character may be used.

In the piston-extension B' is a packing-ring, 10 h, whereby fluid is prevented from escaping beyond the piston-extension.

C designates a drill-holder, constructed with a socket, i, wherein is fitted the shank j of a drill, D. On this shank is a collar or shoulder, j', which bears against the end of the socket i, and thus forms a thrust-bearing, whereby the drill is fed forward with the cylinder. The shank of the drill is so fitted to the socket i that the drill-holder C cannot turn 20 without turning the drill, and in this instance the desired result is accomplished by making both the shank and socket polygonal.

In the socket i is tapped a screw, k, which is not used ordinarily, but which may be tightened when the cylinder is moved backward to 25 withdraw the drill from its hole. The drill-holder C is screwed fast to one end of a sleeve, C', adapted to turn on the exterior of the extension A', and on the other end of the sleeve 30 is screwed or otherwise secured a gear-wheel, C<sup>2</sup>, which is provided with bevel-teeth and spur-teeth.

E designates a hand-crank, which is secured to the shaft of a pinion, E', which gears with 35 the bevel-teeth of the wheel C<sup>2</sup>, and thus serves to turn the sleeve C' and drill-holder C, with the drill D. The inner end of the stem or shaft of the pinion E' is fitted to a bearing, \*, in the side of the cylinder, and between the 40 crank and pinion is a bridge or cross-piece, F, which forms a bearing to the shaft of the pinion, and is secured by bolts to lugs projecting from the cylinder, as shown in my aforesaid application.

The drill-holder C has a bearing on the end 45 of the cylinder-extension A', and sleeve C has or may have a bearing against a shoulder, m, on the cylinder. Longitudinal movement of the sleeve in one direction is thus prevented and similar movement in the other direction 50 is prevented by a collar, G, surrounding the sleeve C' below or beyond the wheel C<sup>2</sup>. The collar or ring G has ears, which receive through them pins or studs projecting from lugs on the 55 cylinder, and are secured by pins or nuts, as also shown in my aforesaid application.

In order to properly vent the extension A' and prevent the accumulation of any cushioning pressure therein, I form in the drill- 60 holder C as many holes s as may be necessary.

Referring now more particularly to the essential features of my present invention, I designates a round non-rotary bar, here shown 65 as hollow for the sake of lightness, and which has near and for a distance inward from one end a screw-thread, o. This bar may be of any suitable length; and I' designates a split

clamp, which is tightened by a bolt, o', and wherein the bar may be adjusted lengthwise and then tightly held to prevent turning. 70 The clamp I' is provided with a round wrist, i'', which may be tightly clamped in a tripod or column support.

J designates a sleeve which is fitted to slide along the bar I, but which is locked against 75 turning thereon. In this example of my invention the bar is grooved at \*\* from one end inward, and in the sleeve J is a feather or spline, J\*, fitting said groove. In the upper part of the sleeve J is a dovetailed slideway, 80 J', and upon the drill-cylinder is a corresponding dovetailed tongue or longitudinal rib, A<sup>3</sup>, which may be slid into the slideway J' until the stop p, which may consist of a pin, strikes against the end of the slideway J', whereupon 85 the sleeve may be tightly clamped upon the drill-cylinder by bolts q. The sleeve and drill-cylinder thus locked together may be fed or moved along the bar I as one piece.

At the front end of the sleeve J is a housing, 90 J<sup>2</sup>, which contains a nut, K, fitting the screw-thread, o, on the bar I. This nut is held against longitudinal movement independently of the sleeve J and drill, and consequently 95 as the nut K is turned the sleeve and cylinder are traversed along the bar I. The nut K has a portion, r, which is externally conical, and thereon is fitted a gear-wheel, L, having a conical bore, and which is pressed upon the taper or conical nut by a spring, r', the 100 tension of which may be regulated by nuts r<sup>2</sup>. The wheel L therefore has a frictional engagement with the nut K. When the drill-cylinder is securely clamped to the sleeve in 105 the position shown, the spur-teeth of the drill-wheel C<sup>2</sup> gear into the teeth of the wheel L and drive the latter, and it will therefore be seen that the whole operation of turning the drill and feeding the machine forward to the 110 work is performed by simply turning the crank E. The rotation of the drill is positive, but the feeding is made self-regulating or variable by reason of the provision afforded for the slipping of the positively-rotating 115 wheel L upon the nut K and the variable rotation of the nut resulting from such slipping.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a non-rotary bar 120 having a screw-threaded portion, of a sleeve locked to said bar to prevent its turning thereon, but capable of sliding along the same, and to which the cylinder of a rock-drill may be secured, and a nut engaging with the screw-thread on said bar and serving by its rotation 125 to effect the movement of said sleeve along the bar, substantially as herein described.

2. The combination, with a non-rotary and screw-threaded bar and support for holding the same in fixed position, of a rock-drill com- 130 prising a cylinder and reciprocating piston supported on and capable of movement lengthwise of said bar, devices for rotating the bit or drill of the machine, a nut fitting upon the



said non-rotary screw-threaded bar, and serving by its rotation to move the machine along said non-rotary bar, and frictional engaging devices, through which the positively operating rotating devices of the rock-drill transmit a variable and self-regulating rotation to said nut, substantially as and for the purpose herein described.

3. The combination, with a non-rotary and screw-threaded bar, of a rock-drill the cylinder of which is supported upon and capable of movement along said bar, and which comprises a fluid-actuated piston for delivering hammer-like blows upon the inner end of the drill, a nut fitting said bar and serving by its rotation to move the rock-drill along said bar, gearing for imparting a positive rotation to the drill, and frictional engaging devices, through which a variable and self-regulated rotation is transmitted to the said nut, substantially as herein described.

4. The combination, with a non-rotary and screw-threaded bar, of a rock-drill the cylinder of which is supported on and capable of movement along said bar, and which comprises a fluid-actuated piston for delivering hammer-like blows upon the inner end of the drill, a nut fitting said bar and serving by its rotation to move the rock-drill along said bar, a gear-wheel having a frictional engagement with said nut, and gearing for transmitting a positive rotary motion to the drill and to said gear-wheel, substantially as herein described.

5. The combination, with a non-rotary screw-threaded bar and a support for holding the same in fixed position, of a rock-drill comprising a cylinder and a reciprocating piston supported upon and capable of movement along said bar, a nut fitting the bar and serving by its rotation to move the rock-drill along the bar, a gear-wheel having a friction fit upon a conical seat on the nut, a spring and means for varying its tension for pressing the said wheel snugly upon the conical seat on the nut, and gearing for imparting a positive rotary motion to said gear-wheel, substantially as herein described.

6. The combination of the screw-threaded bar I, the sleeve J, the nut K, the wheel L, having a frictional engagement with said nut, the rock-drill having its cylinder secured to said sleeve and its fluid-actuated piston arranged to deliver hammer-like blows upon the drill-shank, the crank and pinion E E', the wheel C', having bevel-teeth engaging with said pinion and spur-teeth engaging with the wheel L, and the sleeve C', on which are secured the wheel C' and the drill-holder C, all substantially as herein described.

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Witnesses:

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