

(No Model.)

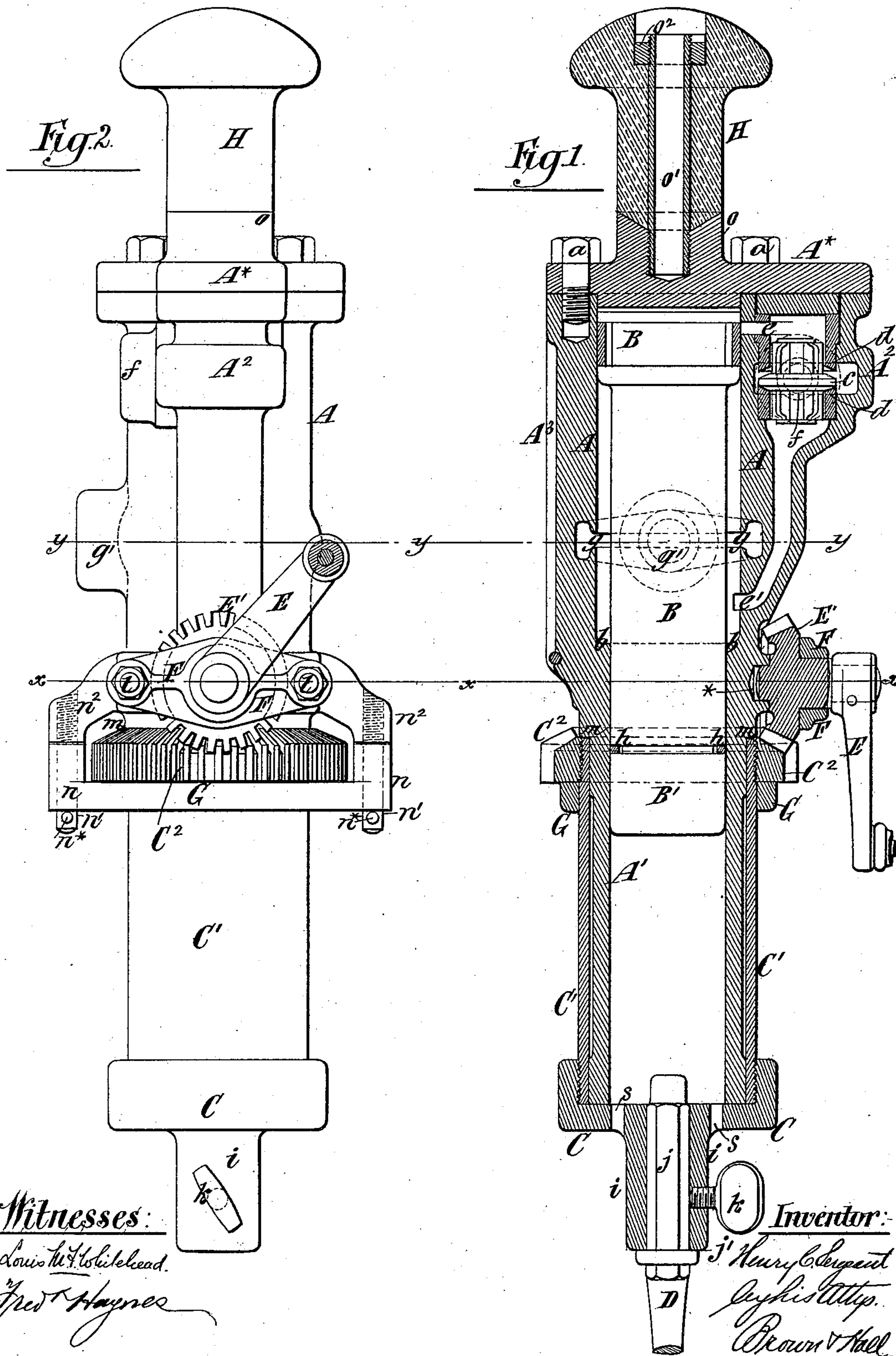
2 Sheets—Sheet 1.

H. C. SERGEANT.

ROCK DRILL.

No. 308,525.

Patented Nov. 25, 1884.



Witnesses:

Louis H. Whitehead.
Fred Haynes

Inventor:

J. Henry Sergeant
By his atty.
Brown & Hall

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Fig. 3.

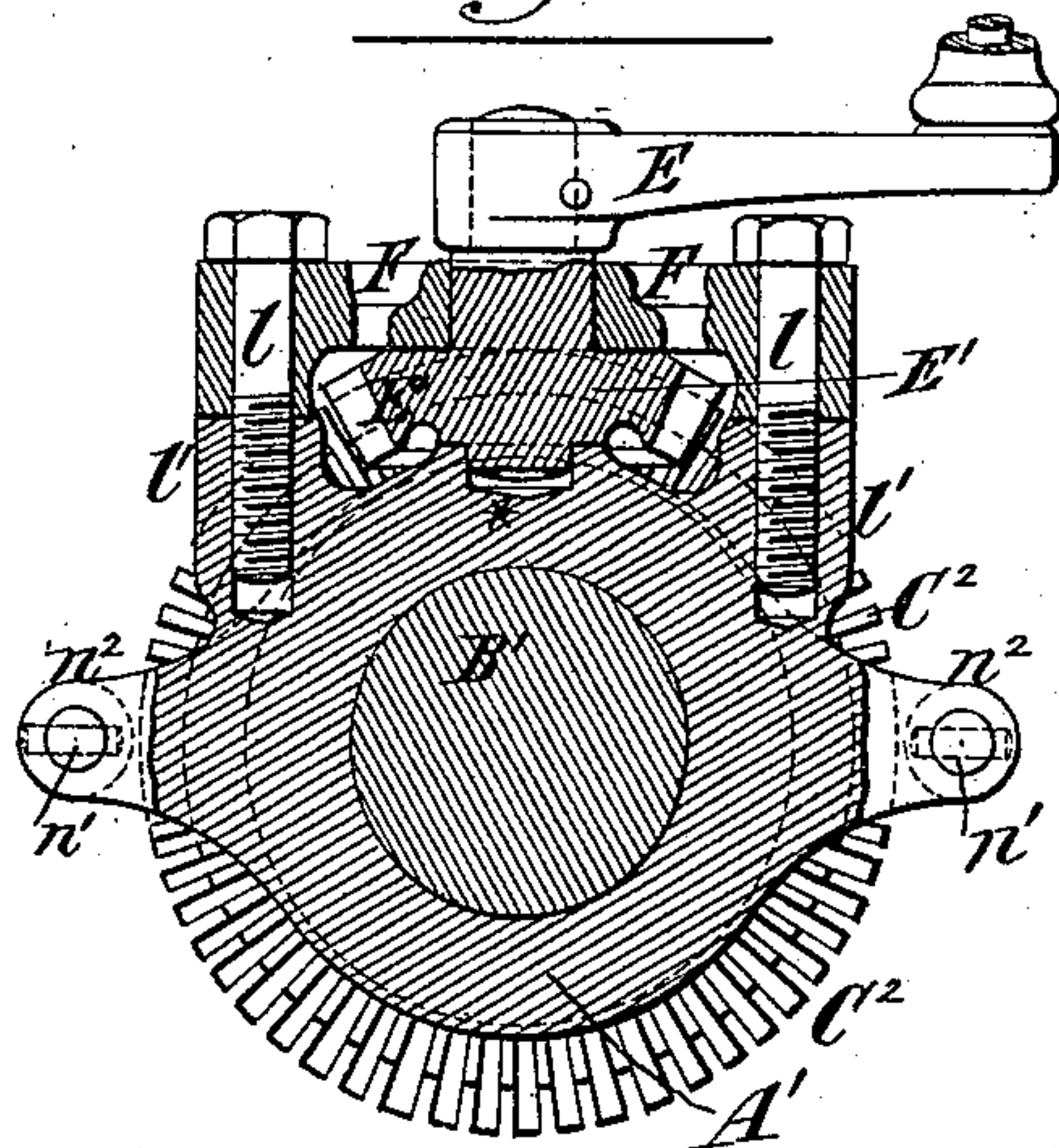
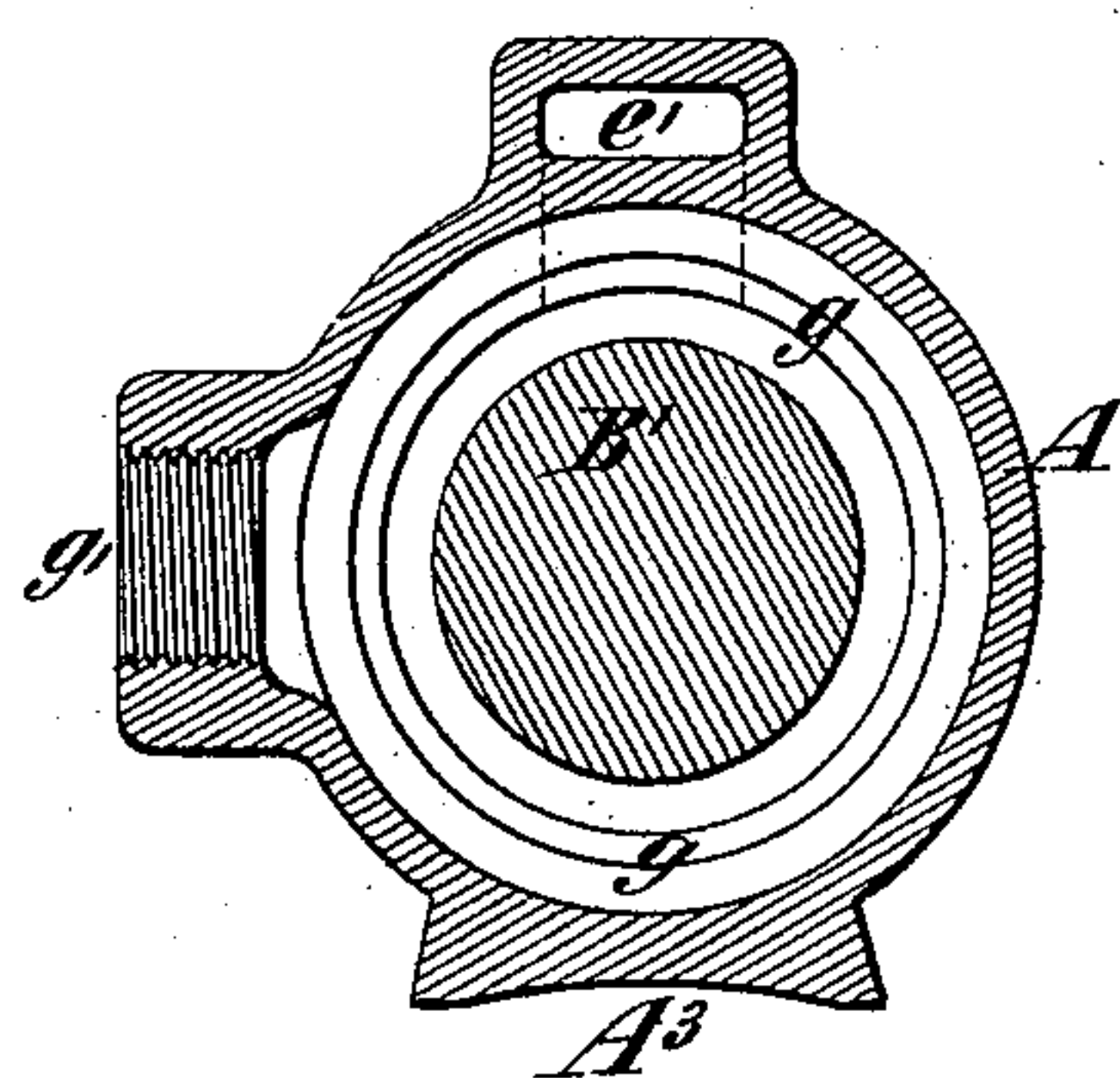


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF NEW YORK, N. Y.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 308,525, 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
5 Improvement in Rock-Drills, of which the following is a specification.

The principal object of my invention is to provide a light and easily-handled machine which may be held by the hands while in op-
10 eration without the use of any tripod, column, or other support, and in which a fluid-actuating piston delivers hammer-like blows upon the inner end of a bit or drill, which is turned as rapidly as may be desired by hand. The
15 action of such a machine closely resembles the ordinary manual operation of drilling by striking a drill with a hammer and turning it between the blows, but is many times more effective and less laborious, inasmuch as the pis-
20 ton is actuated to strike a blow and to return it after striking by steam, air, or any other suitable fluid under pressure.

My invention consists in novel combinations of parts, which are hereinafter described, and
25 pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of a machine embodying my invention, the whole length of the drill not being shown in order to enable
30 the machine to be drawn on a larger scale. Fig. 2 is an elevation of the machine, viewing it from the right hand of Fig. 1. Fig. 3 is a transverse or horizontal section on the plane of the dotted line *x x*, Figs. 1 and 2, looking
35 downward; and Fig. 4 is a corresponding section on the dotted line *y y*, Figs. 1 and 2.

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

A designates a cylinder closed at the upper
40 end by a head, A*, secured by bolts *a*.

B designates a piston arranged to work in the cylinder A, and provided with any suitable packing. The cylinder proper terminates at *b*; but extending beyond that point is
45 a portion, A', of reduced internal diameter, which constitutes an extension of the cylinder, but which, so far as some features of my invention are concerned, may be considered as a part of the cylinder. The piston B likewise
50 has a portion, B', which constitutes an extension thereof, and is slightly smaller in diame-

ter, it being made to fit the cylinder-extension A', and as the cylinder-extension and piston-extension are both longer than the stroke of the piston, the latter is afforded ample
55 guidance in its movements. At one side of the cylinder is a valve-chest, A², in which is arranged a double puppet-valve, *c*, which, by closing on one or other of two seats, *d d'*, admits the motive fluid to opposite ends of the
60 cylinder alternately through ports or passages *e e'*. Steam or other motive fluid is admitted to the valve-chest A² through an inlet, *f*, in the side thereof, and between its ends the cylinder A is provided with an exhaust-belt, *g*,
65 from which leads an exhaust-outlet, *g'*.

The valve *c* here shown and the arrangement of ports and passages for the induction and exhaust of the motive agent to and from the cylinder are the same as shown and de-
70 scribed in my United States Letters Patent No. 295,682, granted March 25, 1884, and therefore no further description thereof is necessary.

In lieu of the valve shown, I may employ
75 any other well-known or suitable form of valve which will admit a motive fluid to produce the reciprocation of the piston B in the cylinder A. The opening in the end of the valve-chest A² is closed by the head A*, which
80 is constructed to cover it, as shown in Fig. 1. When the motive fluid is admitted above the piston it acts upon the whole area thereof; but when admitted to the under side thereof it only has an effective area equal to the an-
85 nular space between the external diameter of the piston-extension B' and the internal diameter of the cylinder A. In the piston-extension B' is fitted a ring-packing, *h*, of any suitable kind, whereby the motive fluid is
90 prevented from escaping downward when admitted to the under side of the piston B.

C designates a drill-holder, which is here shown as consisting of a cap having a bearing against the lower end of the cylinder-extension A', and also having a socket, *i*, for the
95 reception of the shank *j* of a drill, D.

On the shank *j* is a collar or shoulder, *j'*, which has a thrust-bearing against the end of the drill-holder socket *i*, and the shank is long
100 enough to project inward of and above the drill-holder C, as shown in Fig. 1. The drill

is not held in the socket *i* against outward movement, and when the piston or piston-extension strikes a hammer-like blow upon its inner end, the point of the drill bearing against the rock, its shank can move forward in the socket.

In the socket *i* is fitted a screw, *k*; but this is not ordinarily used, and is only to be tightened on the drill-shank when it is desired to withdraw the drill from the hole formed by it. The shank *j* of the drill must, however, be so fitted in the socket *i* that it cannot turn therein, or, in other words, so that the drill-holder and socket cannot turn without also turning the drill.

I have here represented a hand-crank, *E*, for turning the drill-holder *C*, and in this example of my invention the crank is geared with the drill-holder by the following mechanism: The drill-holder *C* is screwed or otherwise secured to one end of a sleeve or tube, *C'*, which is capable of turning freely on the exterior of the cylinder-extension *A'*.

On the upper end of the sleeve *C'* is secured a bevel gear-wheel, *C²*, and the crank *E* is fast upon the shaft or stem of a bevel-pinion, *E'*, which gears with the wheel *C²*. The pinion *E'* is supported and held by the inner end of its stem or shaft fitting a bearing, ***, in the casting of the cylinder; and between the pinion and the crank is a bridge-piece, *F*, wherein is formed a bearing for the pinion-shaft, and which is supported and secured by bolts *l* entering lugs *l'*, cast on the cylinder.

As before stated, the drill-holder *C* bears against the end of the cylinder-extension *A'*, and thereby the sleeve *C'* is held against upward movement on the part *A'*; but the same result may be secured by forming on the exterior of the part *A'* a shoulder, *m*, against which the end of the sleeve *C'* bears, as shown in Fig. 1. Below the gear-wheel *C²* the sleeve *C'* is surrounded by a collar, *G*, having ears *n*, which are secured by pins *n** or nuts upon studs *n'*, projecting from lugs *n²* on the cylinder *A*. By means of the collar *G* the downward movement of the sleeve *C'* and drill-holder *C* is prevented, and the wheel *C²* is held in secure engagement with the pinion *E'*.

Upon the top or head *A** of the cylinder I have shown a breast-piece or hand-piece, *H*, which is preferably of wood, so as not to become highly heated by the heat of the motive fluid. I have here shown a boss or hub, *o*, on the head *A**, into which is screwed a tube, *o'*, and said piece *H* is secured upon said tube and against said boss or hub by a nut, *o²*, as shown in Fig. 1.

In operating the machine the drill is held strongly against the rock by pressure on the hand-piece *H*, and the drill is turned as the piston is reciprocated rapidly. When the motive fluid is admitted above the piston, it of course acts upon the end of the cylinder; but inasmuch as the piston is free to move in the cylinder, and has only a fractional part of the weight of the cylinder, the motive agent will

move or shoot the piston violently forward and cause it to deliver a hammer-like blow upon the drill-shank. Just before the piston strikes its blow it passes beyond and uncovers the exhaust-belt *g* and affords a free exhaust to the motive agent above it.

As before stated, the packing *h* serves to prevent the escape of motive fluid into the cylinder-extension *A'*; but, in order that any fluid which does escape may have free vent and not cushion the piston in its descent, I form holes *s* in the drill-holder *C*, as shown in Fig. 1.

Although my machine is more particularly designed for hand use, I may sometimes mount it upon a support, and to provide for such use of the machine I provide the cylinder with a lug or projection, whereby it may be attached to a support. I have here shown the cylinder *A* as provided with a longitudinal dovetailed projection, rib, or tongue, *A³*, as shown in Figs. 1 and 4.

When the machine is thus used upon a support, it may be desirable to transmit from the wheel *C²* a rotary motion in the same plane for feeding the machine forward. To this end I have shown the wheel *C²* as formed with spur-teeth, as well as bevel-teeth. Such construction of said wheel forms no part of my present invention, but is shown and its purpose described in my application for Letters Patent filed June 2, 1884, and of which the serial number is 133,464.

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

1. The combination, with the cylinder and piston of a fluid-actuated rock-drill, of a drill-holder at the end of said cylinder, a crank and gearing for turning said drill-holder, and a drill fitted to said holder to turn therewith and arranged to receive the hammer-like blows of the piston upon its inner end, substantially as herein described.

2. The combination, with the cylinder and piston of a fluid-actuated rock-drill, of a drill-holder against which the end of the cylinder bears, but which is capable of turning independently of the cylinder, a crank and gearing for turning said drill-holder, and a drill fitted to turn with said drill-holder, having a thrust-bearing against the same, and arranged to receive upon its inner end the hammer-like blows of the piston, substantially as and for the purpose herein described.

3. The combination, with the cylinder and piston of a fluid-actuated rock-drill, the cylinder having a breast-piece at one end, of a drill-holder at the other end of the cylinder, a crank and gearing for turning said drill-holder, and a drill fitted to said holder to turn therewith and arranged to receive the hammer-like blows of the piston upon its inner end, substantially as and for the purpose herein described.

4. The combination, with the cylinder and piston of a fluid-actuated rock-drill having a cylinder-extension and piston-extension slight-

ly smaller in diameter than the cylinder and piston, of a direct-acting valve for admitting motive fluid to said cylinder, a drill-holder at the end of the cylinder-extension, a crank and gearing for turning said drill-holder, and a drill fitted to turn with said holder and to receive the hammer-like blows of the piston upon its inner end, substantially as herein described.

10 5. The combination, with the cylinder and piston of a fluid-actuated rock-drill, the cylinder being provided with projections or lugs whereby the machine may be secured to a support, of a drill-holder capable of turning relatively to the cylinder, gearing for turning said holder, and a drill fitted to turn with the drill-holder and arranged to receive the hammer-like blows of the piston upon its inner end, substantially as herein described.

6. The combination, with the cylinder and its extension A A' and the piston and piston-extension B B', of the sleeve C', the drill-holder C on one end of said sleeve, the drill D in said holder, the gear-wheel C² on the other end of said sleeve, the pinion E', and crank E for turning said sleeve, drill-holder, and drill, substantially as herein described.

7. The combination, with the cylinder and extension A A', of the sleeve C', the wheel C² upon the end thereof, the collar G, surrounding the sleeve and serving to retain it against end movement, and the pinion and crank E' E for turning said sleeve, substantially as herein described.

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Witnesses:

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FREDK. HAYNES.