No. 871,594. PATENTED NOV. 19, 1907.

E. N. JONES.

ROCK DRILL.

APPLICATION FILED FEB. 28, 1907.

2 SHEETS—SHEET 1.

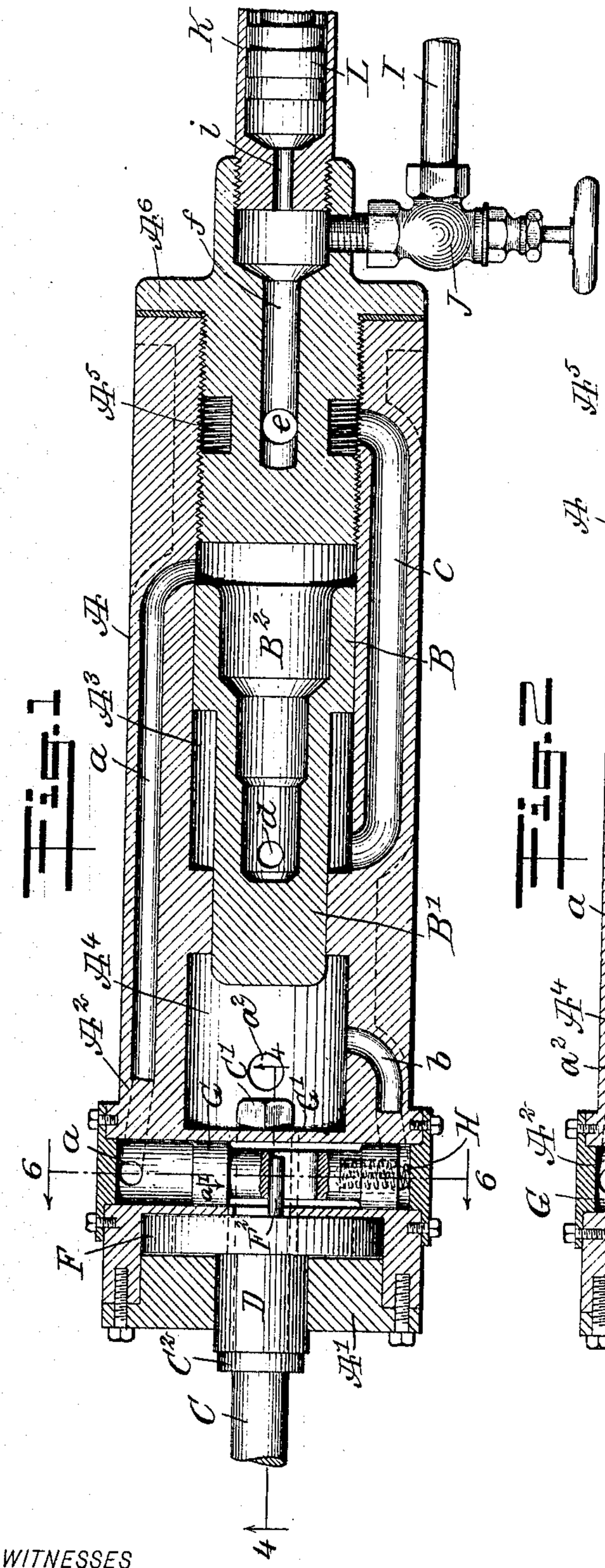


FIG. 1.

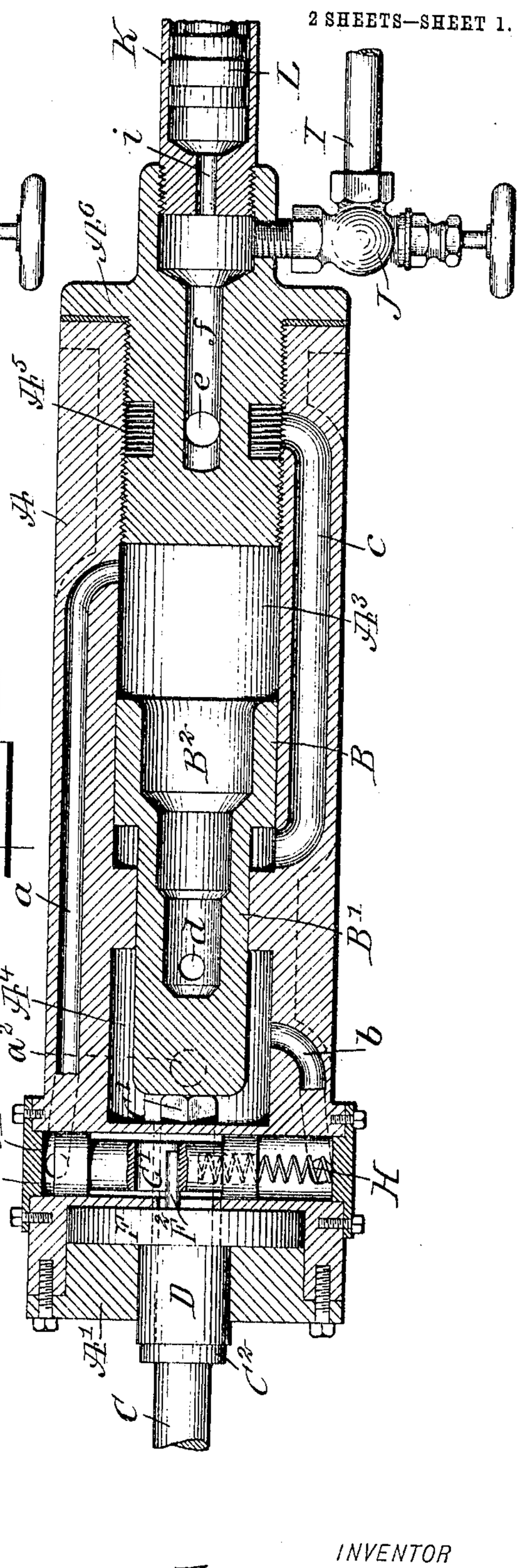


FIG. 2.

WITNESSES

F. D. Sweet.

Geo. J. Hoskins

INVENTOR

Edward N. Jones

BY Munn & Co

ATTORNEYS

No. 871,594. PATENTED NOV. 19, 1907.

E. N. JONES.

ROCK DRILL.

APPLICATION FILED FEB. 28, 1907.

2 SHEETS—SHEET 2.

Fig. 1.

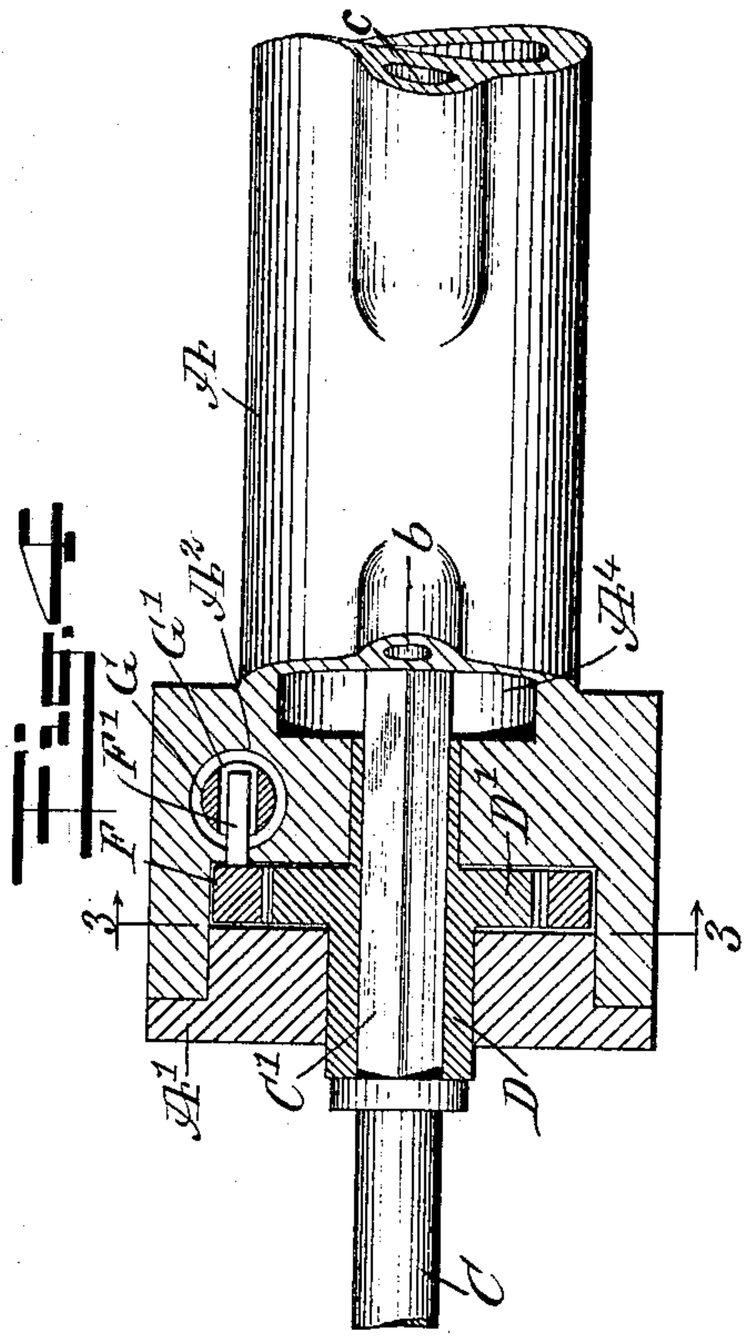


Fig. 2.

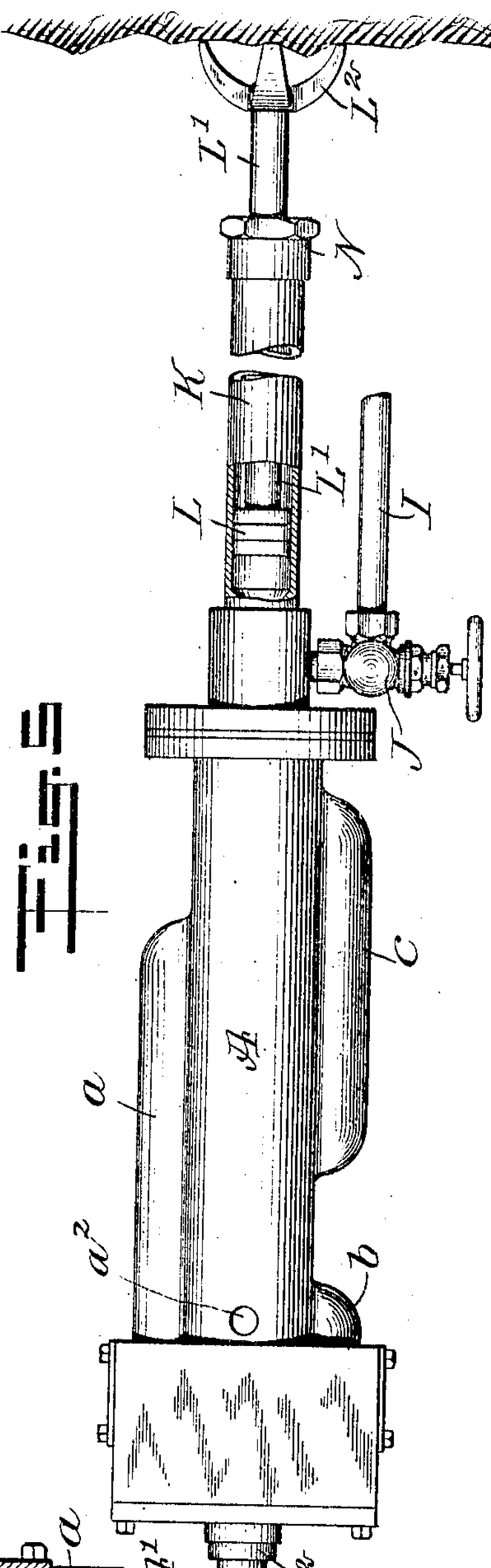


Fig. 3.

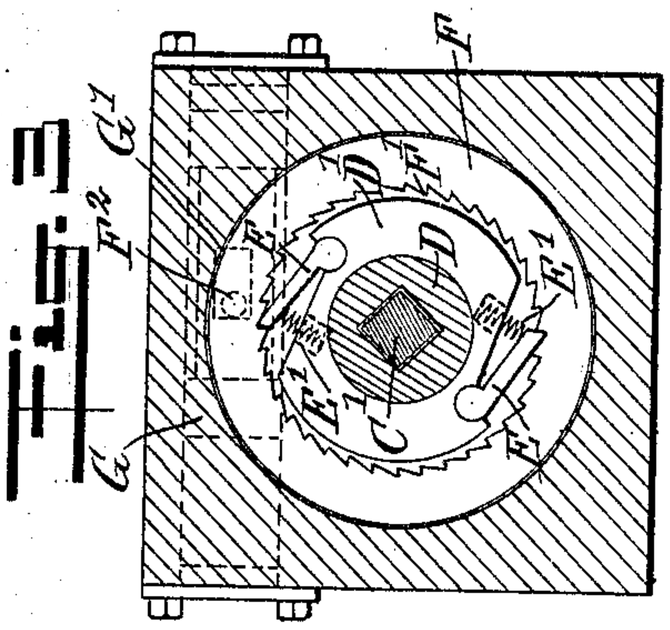
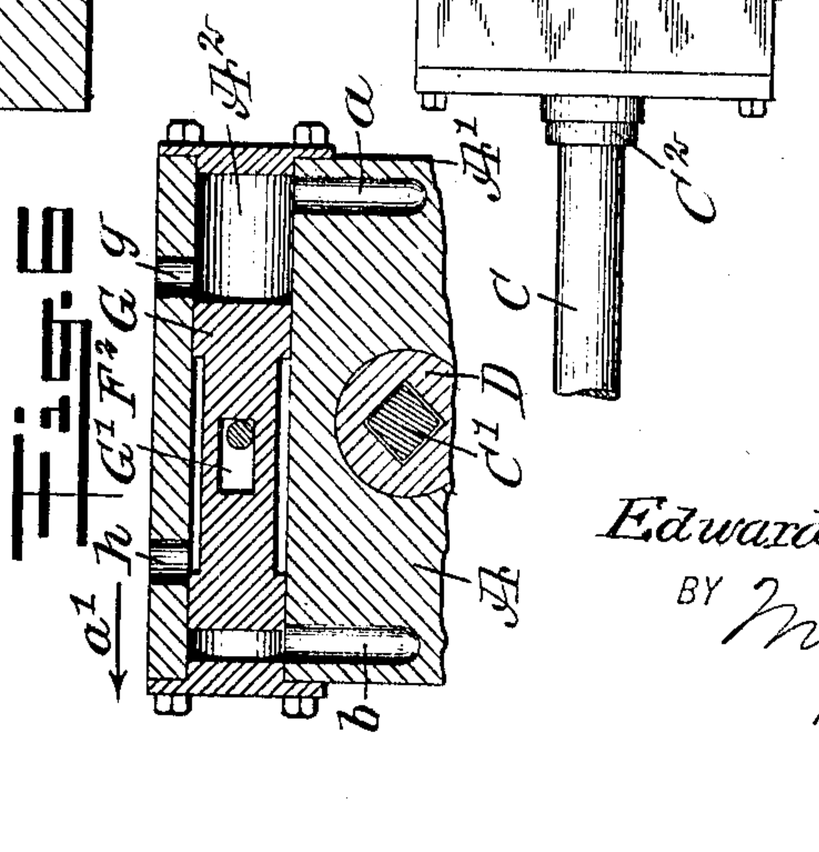


Fig. 4.



WITNESSES

F. D. Sweet.

Rud. J. Hoerder

INVENTOR

Edward N. Jones

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD N. JONES, OF VICTOR, COLORADO.

ROCK-DRILL.

No. 871,594. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed February 28, 1907. Serial No. 359,722.

To all whom it may concern:

Be it known that I, EDWARD N. JONES, a citizen of the United States, and a resident of Victor, in the county of Teller and State of Colorado, have invented a new and Improved Rock-Drill, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rock drill, which is simple and durable in construction, very effective in operation, and arranged to automatically turn the drilling tool previous to the blow being struck by the hammer piston on the drilling tool.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawing forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal central section of the improvement; Fig. 2 is a like view of the same and showing the hammer piston at the end of the striking stroke; Fig. 3 is a transverse section of the hammer for turning the drilling tool, the section being on the line 3—3 of Fig. 4; Fig. 4 is a longitudinal sectional elevation of the same; Fig. 5 is a side elevation of the improvement, part being in section, and Fig. 6 is a transverse section of the means for turning the drilling tool, the section being on the line 6—6 of Fig. 1.

In the cylinder A of the rock drill is mounted to reciprocate the hammer piston B adapted to strike blows on the inner end of the polygonal shank C′ of the drilling tool C, for the latter to drill the hole into the rock or other material. The polygonal shank C′ is mounted to turn with and slide in an axial direction in the polygonal bore of a chuck D mounted to turn in the forward head A′ of the cylinder A. The chuck D is provided with a flange D′ carrying one or more pawls E pressed outwardly by springs E′, to hold the free end of each pawl in engagement with the ratchet teeth F′ formed on the ratchet wheel F mounted to turn in the head A′ of the cylinder A.

The ratchet wheel F is provided with a longitudinally extending pin or lug F^2, projecting into an elongated aperture G′ formed in an auxiliary piston G, mounted to reciprocate transversely in a cylinder A^2 formed on the forward end of the cylinder A. The auxiliary piston G is moved in the direction of the arrow *a′* (see Fig. 6) by the fluid pressure used for actuating the piston B, and the return movement of the piston G is accomplished by the exhaust motive agent from the cylinder A, aided by a spring H pressing one end of the auxiliary piston G. Now the live motive agent for moving the piston G in the direction of the arrow *a′* enters the cylinder A^2 by way of an admission port *a* connected with the working chamber A^3 of the cylinder A, and the exhaust motive agent from the exhaust chamber A^4 of the cylinder A passes by way of a port *b* into the other end of the auxiliary cylinder A^2. The motive agent is passed into the working chamber A^3 by way of an admission port *c* opening into the forward end of the working chamber A^3, and which forward end is adapted to register with a port *d* formed in the reduced end B′ of the cylinder B and opening into the recess B^2 formed in the piston B and part of its reduced portion B′, as plainly indicated in Figs. 1 and 2.

The admission port *c* leads from an annular recess A^5 formed in the head A^6 at the rear end of the cylinder A, and the recess A^5 registers with the port *e* leading to an inlet channel *f* connected with the supply pipe I, having a valve J and connected with a suitable source of pressure supply. Now when the several parts are in the position illustrated in Fig. 1, and the valve J is open, then the motive agent passes by way of the pipe I into the channel *f*, and from the latter by way of the port *e* into the recess A^5, and by way of the admission port *c* into the forward end of the working chamber A^3. The motive agent from the working chamber A^3 can now pass by way of the port *d* and recess B^2 into the rear end of the working chamber A^3, to force the piston B outward, so that the forward face of the reduced portion B′ strikes the inner end of the shank C′, thus forcing the drilling tool C in engagement with the material in the bottom of the drill hole.

When the parts are in the position shown in Fig. 1, then a portion of the motive agent passing into the rear end of the working chamber A^3 passes by way of the port *a* into one end of the auxiliary cylinder A^2, to force the piston G transversely in the direction of the arrow *a′*, so that the piston G acting on the pin F^2 turns the ratchet wheel F, which

carries along the pawls E, thus turning the chuck D and consequently the drilling tool C immediately previous to the piston B striking a blow on the inner end of the shank C′ of the drilling tool C. Now when the piston B is at the end of its outer stroke, the port *d* is cut off from the inner end of the working chamber A^3 and is now in communication with the exhaust chamber A^4, as plainly indicated in Fig. 2, and consequently the motive agent exhausts from the rear end of the working chamber A^3 by way of the recess B^2 and port *d* into the exhaust chamber A^4. The exhaust passes from this chamber A^4 by way of the exhaust port *b* into the auxiliary cylinder A^2, to immediately return the auxiliary piston G to its former position aided by the action of the spring H. As all of the exhaust motive agent is not utilized or required to produce the return movement of the auxiliary piston, the chamber A^4 is provided with the port a^2 for the escape of the same. Now the auxiliary piston G during this return movement carries the pin F^2 along, thus rotating the ratchet wheel F in the reverse direction, but the ratchet wheel in doing so does not take along the pawls E, as the free ends thereof now glide over the teeth F′.

It is understood that when the piston G is moved over in the direction of the arrow *a′* and reaches the end of its stroke, then the piston G uncovers an exhaust port *g*, to allow the motive agent to pass out of this end of the auxiliary cylinder A^2, and consequently when the blow is struck by the piston B and the exhaust takes place from the chamber A^4 into the auxiliary cylinder A^2, then the exhaust motive agent with the aid of the spring H can readily return the piston G to its normal position, as indicated in Fig. 2. When this takes place the piston G uncovers another exhaust port *h*, to allow the motive agent in the auxiliary cylinder A^2 to pass out to the open air, or, in other words, the device for turning the drilling tool C is utilized to form a final escape for the motive agent from the exhaust chamber A^4, and the exhaust motive agent is utilized to produce a return movement of the auxiliary piston G.

In order to feed the rock drill and to form a cushion for the same, use is made of the motive agent employed for running the rock drill, and for this purpose the head A^6 of the cylinder A is provided with a rearwardly extending cylinder K connected at its forward end by a channel *i* with the channel *f*, so that the motive agent from the supply pipe I can pass into the forward end of the cylinder K. In the latter is mounted to reciprocate a piston L having its piston rod L′ extending through a suitable stuffing box N at the rear end of the cylinder K. The outer end of the piston rod L′ is provided with a spike or claw foot L^2 adapted to engage a wall or other support, as indicated in Fig. 5.

Now when the rock drill is running, the motive agent passes into the forward end of the cylinder K to press against the piston L therein, but as the latter is held stationary by the foot L^2 engaging a fixed support, it is evident that the cylinder A and the parts carried thereby are forced forward as the drilling progresses, that is, the rock drill is fed automatically forward and at the same time is cushioned by the motive agent in the forward end of the cylinder K.

It is understood that the rearward sliding movement of the drilling tool C is limited by a collar C^2 formed on the drilling tool and adapted to abut against the forward end of the chuck D.

From the foregoing it will be seen that immediately previous to the hammer piston B striking a blow on the drilling tool C, the latter is turned by the action of the auxiliary piston G, the ratchet wheel F and the pawls E, and the said auxiliary piston G is actuated by the live motive agent used for imparting a forward sliding motion to the piston B.

It will also be noticed that the exhaust motive agent from the chamber A^4 is utilized to return the piston G to its normal position, and the exhaust motive agent passes from the chamber A^4 to the outer air by way of the exhaust ports *d*, *h* and the cylinder A^2.

It is further understood that the return or rearward movement of the piston B takes place immediately after the motive agent has been exhausted from the rear end of the working chamber A^3 into the exhaust chamber A^4, as the motive agent in the forward end of the working chamber A^3 acts on the forward face of the piston, to return the same.

Having thus described my invention, I claim as new and desire to secure by Letters Patent

1. A rock drill comprising a main cylinder, a hammer piston therein, a drill chuck in which the drilling tool is mounted to slide and to turn with the said chuck, a pawl on the said drill chuck, a loosely mounted ratchet wheel engaged by the said pawl, an auxiliary cylinder connected by an admission port and by an exhaust port with the said main cylinder, an auxiliary piston in the said auxiliary cylinder, and means for connecting the piston with the said ratchet wheel to turn the latter.

2. A rock drill, comprising a main cylinder, a hammer piston therein, a drill chuck in which the drilling tool is mounted to slide and turn with said chuck, a pawl on the chuck, a ratchet wheel surrounding the chuck and with which the pawl engages, an auxiliary cylinder arranged at right angles to the main cylinder and in communication therewith, an auxiliary piston in said auxil-

iary cylinder, and a loose connection between the piston and the ratchet wheel.

3. A rock drill comprising a main cylinder, a hammer piston in the cylinder, a drill chuck in which the drilling tool is mounted to slide and turn with the chuck, a pawl carried by the chuck, a ratchet wheel engaged by the pawl and provided with a pin or lug, an auxiliary cylinder arranged at right angles to the main cylinder and in communication therewith, and a piston in the auxiliary cylinder and provided with an opening into which the pin or lug of the ratchet wheel projects.

4. A rock drill, comprising a main cylinder, a hammer piston in the cylinder, a drill chuck in which the drilling tool is mounted to slide and turn therewith, an auxiliary cylinder provided with exhaust ports and to the ends of which exhaust ports of the main cylinder lead, a reciprocating piston in the cylinder and controlling the exhaust ports thereof and the exhaust ports of the main cylinder leading thereto, and means for operating the chuck from the auxiliary piston.

5. A rock drill, comprising a main cylinder having a working chamber and an exhaust chamber, a motive agent supply connection in communication with the working chamber, a hammer piston working in the said chambers and provided with a chamber having a port at its forward end, an auxiliary cylinder communicating with the working and exhaust chambers, a piston in the auxiliary cylinder, a drill chuck, and means for rotating the chuck from the auxiliary piston.

6. A rock drill, comprising a main cylinder having a working chamber and an exhaust chamber, a motive agent supply connection in communication with the working chamber, a hammer piston working in the said chambers and provided with a chamber having a port at its forward end, an auxiliary cylinder communicating with the working and exhaust chambers, a piston in the auxiliary cylinder, a drill chuck in which the drilling tool is mounted to slide and to turn therewith, a pawl carried by the chuck, a ratchet wheel with which the pawl engages, and a pin and slot connection between the auxiliary piston and the ratchet wheel.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD N. JONES.

Witnesses:

FRANK E. JACKSON,

WILLIAM RENSHAW.