No. 795,735. PATENTED JULY 25, 1905.

C. H. SHAW.

FLUID PRESSURE FEEDING DEVICE FOR ROCK DRILLING ENGINES.

APPLICATION FILED JUNE 1, 1904.

2 SHEETS—SHEET 1.

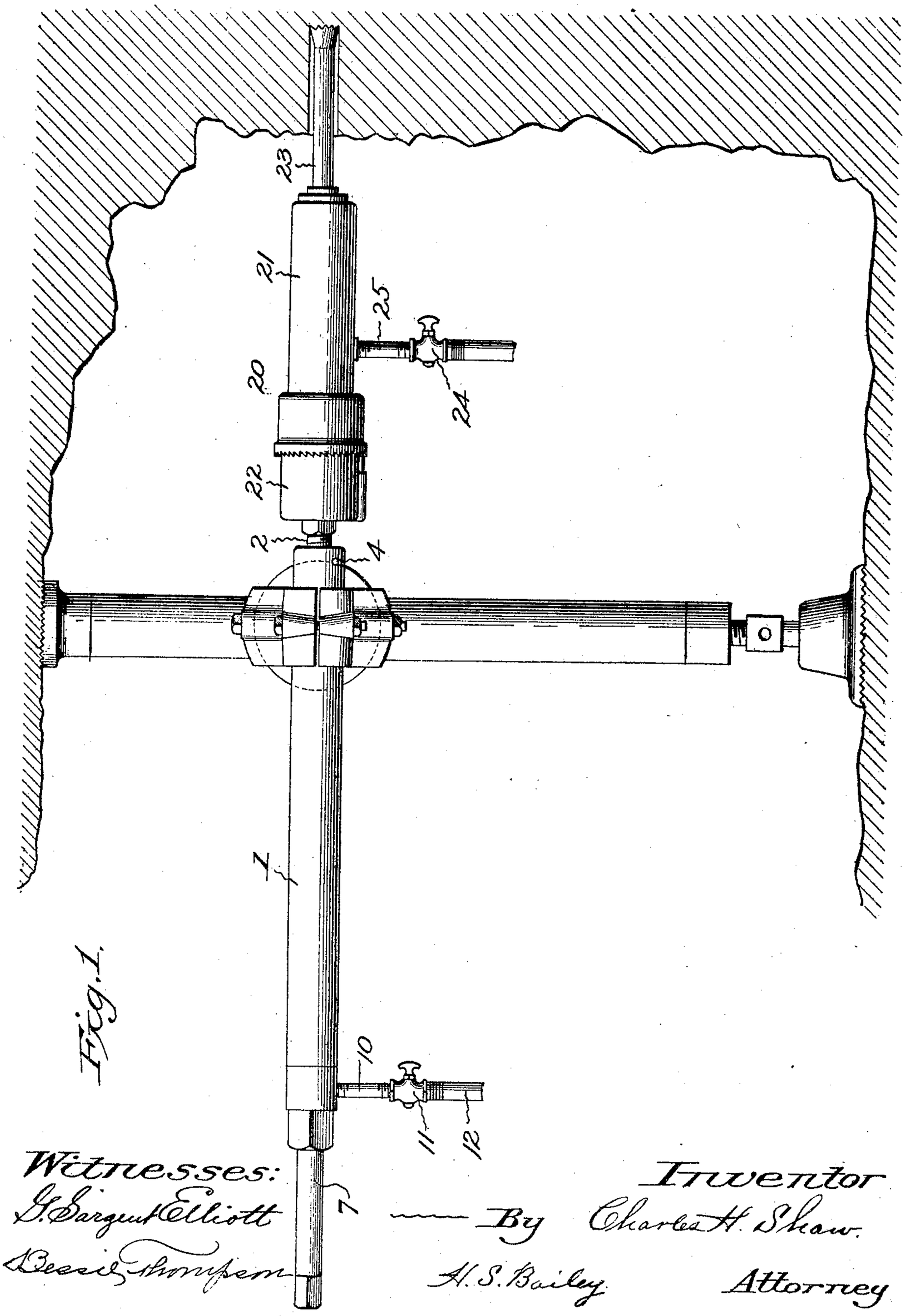

Fig. 1.

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Fig. 3.

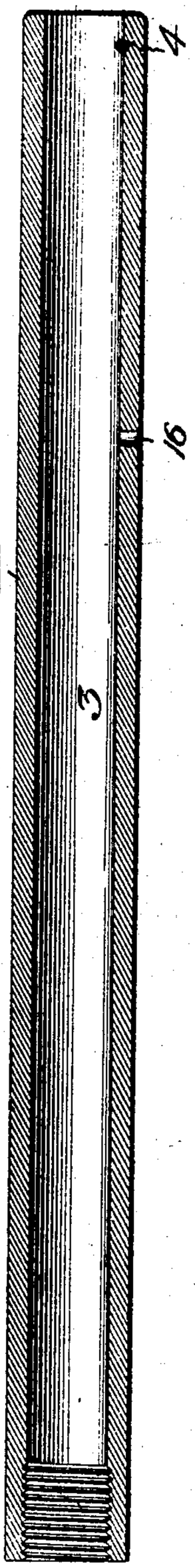


Fig. 2.

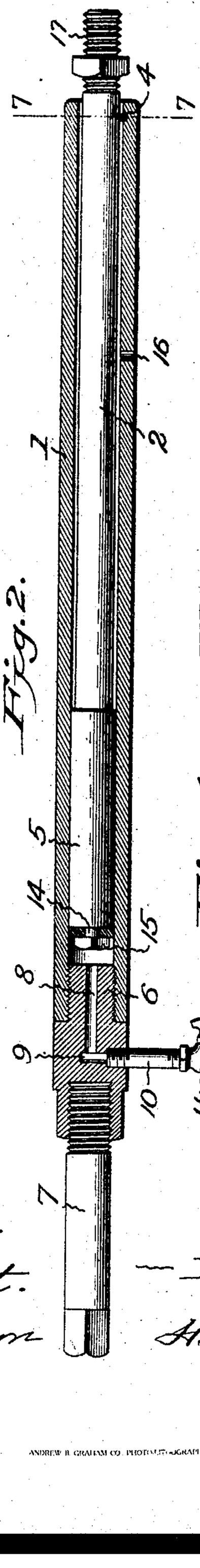


Fig. 7.

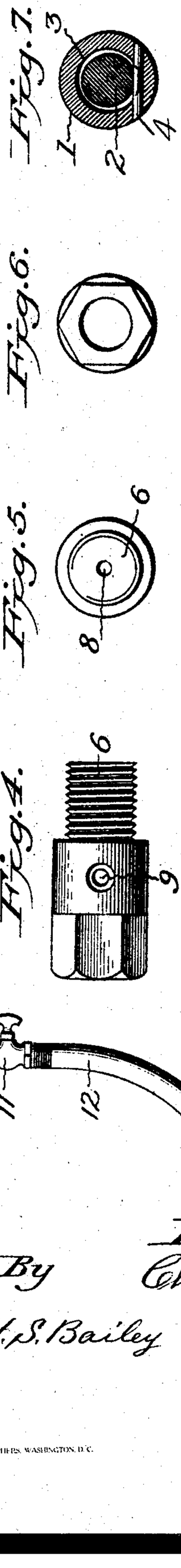
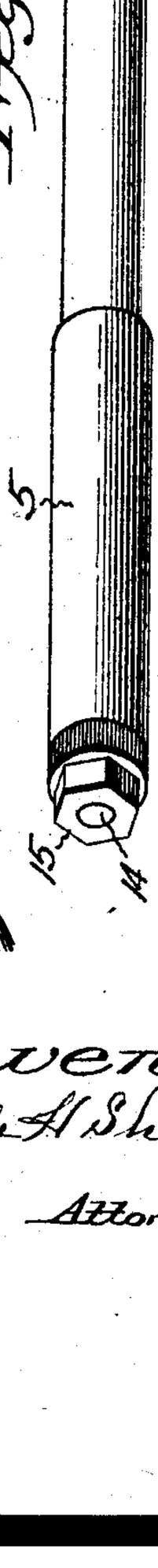


Fig. 6.

Fig. 5.

Fig. 4.

Fig. 8.



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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE FEEDING DEVICE FOR ROCK-DRILLING ENGINES.

No. 795,735. Specification of Letters Patent. Patented July 25, 1905.

Application filed June 1, 1904. Serial No. 210,704.

To all whom it may concern:

Be it known that I, CHARLES H. SHAW, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Fluid-Pressure Feeding Devices for Rock-Drilling Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to a new and improved means for feeding rock-drilling engines and rock-cutting drill-bits when drilling holes in rock.

The improved feed device comprises a feed-cylinder having a piston which carries the drilling-engine, there being a pressure-inlet at the rear end of the cylinder and a pressure-vent at the front end of the cylinder, the vent being opened by the forward movement of the piston. The feed-cylinder and the engine are provided with separately-controllable pressure-supply passages, whereby each can be independently regulated.

Referring to the accompanying drawings, Figure 1 is a side elevation of my improved fluid-pressure feed mechanism operatively attached to a rock-drilling engine. Fig. 2 is a longitudinal sectional view through the feed mechanism detached. Fig. 3 is a longitudinal sectional view through the cylinder of the feed mechanism. Fig. 4 is a side elevation of the plug or cylinder-head, which is screwed into the rear end of the cylinder. Fig. 5 is an end view of the inner end of the plug or cylinder-head. Fig. 6 is an end view of the outer end thereof. Fig. 7 is a transverse sectional view taken on the line 7 7 of Fig. 2; and Fig. 8 is a perspective view of the piston-rod, which operates within the cylinder.

Similar numerals of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates the cylinder, and 2 the piston, of my fluid-pressure cylinder feeding device. The cylinder comprises a long cylindrical tube provided with a continuous bore 3 from end to end. The front end of this bore is preferably left open, and a pin 4 is inserted transversely through the shell to project slightly into the bore of the cylinder and form a stop to the forward stroke of the piston-head 5. The rear end of the bore of the cylinder is interiorly threaded, and a plug-shaped cylinder-head is provided with a reduced hub portion 6, that is threaded to extend into the cylinder a short distance. This plug cylinder-head extends rearward from the cylinder a short distance, and a square or polygonal wrench-receiving surface is formed on the end of it. In the end of the plug a threaded aperture is formed in which one end of a brace-bar 7 is loosely threaded. The opposite end of this brace-bar is provided with a square or polygonal-shaped wrench-receiving terminal end. The brace-bar is not an essential part of my fluid-cylinder and can be dispensed with, if desired. It is used in drilling some holes to brace the cylinder where it is inconvenient to use a stopping-bar and clamp for supporting the cylinder. In the center of the inner end of the plug I form an axial aperture 8, which extends into the plug far enough to be intersected by a hole 9, drilled transversely into the body of the plug beyond the cylinder. These two apertures form the fluid-pressure-inlet port of the cylinder and they are preferably arranged in the cylinder-head. The entrance to the inlet-aperture 9 is threaded and a nipple 10 is threaded to it, to which a suitable valve 11 is connected to control the pressure of the fluid flowing to the cylinder. To the valve a hose 12 is secured, that leads to a source of fluid-pressure supply. The piston-rod 2 is a little smaller in diameter than the cylinder, and it is provided with a piston-head 5, that is made long enough to form a bearing that will support the piston-rod reciprocally in the cylinder. At the rear end of the piston-head the threaded stem 14 is formed, on which is mounted a leather washer, and a nut 15 is threaded on the stem and is screwed against and clamps the washer enough to expand it against the inner peripheral bore of the cylinder and forms a packing-ring for the piston. The piston is moved forward in the cylinder from the end of its rearward stroke or from the rear end of the cylinder forward to the front end of the cylinder until the piston uncovers a waste-fluid-escape hole 16, formed through the shell of the cylinder at a point just back of the position of the piston-head when at the end of its forward stroke, which allows the fluid-pressure to escape when the piston has passed it, thus relieving the piston of pressure and at the same time informing the attendant that the piston has arrived at

the end of its feed movement and must be moved back in the cylinder and started over again. The outer end of the piston may be connected in any suitable manner to the drilling-engine; but I preferably form a slightly-reduced threaded portion 17 at its end, upon which is threaded a nut 18, and screw the threaded end of the piston-rod into a threaded hole formed in the rear end of a rock-drilling engine 20 in axial alinement with its longitudinal center, thus supporting the drilling-engine rigidly in direct alinement with the feed-cylinder.

The rock-drilling engine illustrated is of the piston-hammer type and comprises a cylinder 21, provided with an axial bore, a cylinder-head 22, to which the piston-rod is secured, and suitable pressure-fluid ports and passages, a piston-hammer reciprocally mounted in the cylinder, and a rock-cutting drill-bit 23, operatively mounted in the cylinder in the reciprocal path of the piston-hammer. A valve 24 is placed in the inlet-pipe 25 close to the cylinder, and a hose leads from the valve to a source of fluid-pressure supply.

The drilling-engine does not form any part of my present invention except to illustrate the application of my invention to it, and further description of it is unnecessary.

The operation of my improved fluid-pressure feed-cylinder and piston is as follows: The fluid-pressure cylinder is supported by the brace-bar or by a stopping-bar, which I illustrate in a position to bring the rock-drilling engine in operative relation to rock, and the fluid-pressure is admitted to the cylinder through the valve and inlet-port holes to the rear end of the piston, which is under a constant pressure that presses it forward with a constant steady pressure that moves the drilling-engine forward and the drill-bit quickly against the rock and holds it there. The rock-drilling engine is then started up and the drilling-engine and drill-bit are fed just as fast forward into the rock as the drill-bit cuts into the rock as the pressure on the back of the piston is steady, even, and constant to the end of its forward stroke, when it passes its waste-exhaust outlet and the fluid-pressure ceases and the feed stops. The fluid-pressure is then shut off and the piston-rod and drilling-engine and drill-bit are then moved backward until the piston-rod reaches the rear end of its rear stroke, when a longer drill-bit is inserted, and the cylinder and drilling-engine are moved closer to the rock and readjusted, and the fluid-pressure is again turned on and the drilling and feeding is continued until the fluid-pressure-operated piston again reaches the end of its forward stroke, when it is again retracted and again started over.

By "fluid-pressure" I mean a supply of compressed air, steam or water, or a watery fluid under pressure, or any other suitable piston-actuating expansive fluid.

While I have illustrated my fluid-pressure device operatively connected to a pneumatic-hammer type of piston-hammer rock-drilling engine, my invention contemplates its use in connection with any and all types, styles, and kinds of rock-drilling, channeling, stone-dressing, and carving machines, and while I have illustrated and described the preferred construction of my improved fluid-pressure drill-feeding device I do not wish to be limited to the detailed construction and arrangement shown.

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

1. The combination of a rock-drilling engine, a feed device comprising a cylinder and a piston, said engine carried by said piston, and separately-controllable pressure-supply passages leading to the engine and feed-cylinder.

2. The combination of a rock-drilling engine, an adjustably-supported feed device comprising a cylinder and a piston, said engine carried by said piston, and separately-controllable pressure-supply passages leading to the engine and feed-cylinder.

3. In combination, a drill-feed device comprising a cylinder and a piston, a pressure-inlet at the rear end of said cylinder, said vent opened by the forward movement of said piston, a pressure-vent at the front end of said cylinder, and a separate drilling-engine connected to the feed-piston.

4. In combination, an adjustably-mounted drill-feed device comprising a cylinder and a piston, a pressure-inlet at the rear end of said cylinder, a pressure-vent at the front end of said cylinder, said vent opened by the forward movement of said piston, and a separate drilling-engine carried by said piston.

5. In a fluid-pressure feeding device for rock-drilling engines, the combination with a pneumatic-hammer drill of a fluid-pressure feed-cylinder arranged in axial alinement with said pneumatic hammer and provided with a piston-rod secured at its outer end to said pneumatic hammer, and reciprocally mounted in said fluid-cylinder, a pressure-vent opened by the forward movement of said piston, a plug in the rear end of said fluid-pressure cylinder, and a fluid-inlet passage through said plug into the rear of said piston, substantially as described.

6. In a fluid-pressure feeding device for rock-drilling engines, the combination with a pneumatic-hammer rock-drill, of a fluid-pressure feed-cylinder, arranged in axial alinement with said pneumatic hammer, and comprising a cylinder arranged and adapted to be held in a fixed position relative to said pneumatic hammer, a piston-rod provided with an enlarged piston-head reciprocally

mounted in said cylinder, and arranged to receive a constant fluid-pressure on its rear end, said piston-rod having its outer end rigidly secured to the rear end of said pneumatic hammer, a cylinder-head in the rear end of said cylinder, a fluid-inlet in said cylinder-head adapted to admit a supply of fluid-pressure to the rear end only of said piston, and means including a fluid-escape passage in said cylinder for defining the feeding stroke of said piston, whereby a fluid-pressure at the rear of said feed-cylinder's piston, feeds said pneumatic hammer forward from said feed-cylinder as fast as said pneumatic-hammer rock-drill cuts into rock, substantially as described.

7. In a fluid-pressure feeding device for rock-drilling engines, the combination with the pneumatic-hammer drill, of a piston-rod secured at its outer end to the rear end of said pneumatic-hammer drill at its axial center, and extending rearward therefrom, and reciprocally mounted in a fluid-pressure-receiving cylinder, adapted to be held in a fixed relative position when operatively drilling rock to said pneumatic-hammer drill, a rear cylinder-head in said fluid-pressure cylinder, a fluid-pressure inlet arranged to deliver a supply of fluid-pressure to the rear end only of said feed piston-rod, a fluid-escape aperture positioned in said feed-cylinder to define the limit of the operative feed-stroke of said feed-piston and to relieve the piston of pressure, and means for operatively supporting and securing said feed-cylinder in fixed positions to operatively feed said pneumatic-hammer drill forward as fast as it cuts into rock, substantially as described.

8. In a fluid-pressure feeding device for rock-drilling engines, the combination with the pneumatic-hammer rock-drill, of a fluid-pressure cylinder, a piston secured at one end to the rear end of said pneumatic-hammer rock-drill, and reciprocally mounted in said fluid-pressure cylinder, a plug-shaped cylinder-head secured to the rear end of said cylinder, an axial fluid-pressure inlet in said cylinder-head, a transverse fluid-pressure aperture extending through said cylinder-head, and connecting with said axial fluid-inlet, and a brace-bar threaded to the end of said plug-shaped cylinder-head, substantially as described.

9. In a fluid-pressure feeding device for rock-drilling engines, the combination with the pneumatic-hammer drill of the fluid-pressure feed-cylinder and piston, comprising the cylinder, the piston reciprocally mounted at one end in said cylinder and secured at its opposite end to said pneumatic hammer, and a plug-shaped cylinder-head threaded to its rear end, a motive-fluid-inlet passage extending through said plug cylinder-head into said cylinder at the rear end of said piston-rod and provided with a threaded hole in its end, and a brace-bar comprising a bar loosely threaded to the end of said cylinder-head at one end and provided with a wrench-receiving surface at its opposite end, substantially as described.

10. In a fluid-pressure feeding device for rock-drilling engines, the combination with the pneumatic-hammer drill, of the feed-cylinder and its piston, means for supporting said cylinder and piston, a motive-fluid inlet in said feed-cylinder, a nipple threaded to said inlet, a valve threaded to said nipple, provided with a hose-nipple, a fluid-pressure-supply hose connected at one end to said nipple, and a pressure-supply pipe leading to said drill, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES H. SHAW.

Witnesses:

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BESSIE THOMPSON.