May 18, 1926. 1,585,428

F. M. SLATER

ROCK DRILL

Filed August 1, 1924 2 Sheets-Sheet 1

Fig. 1

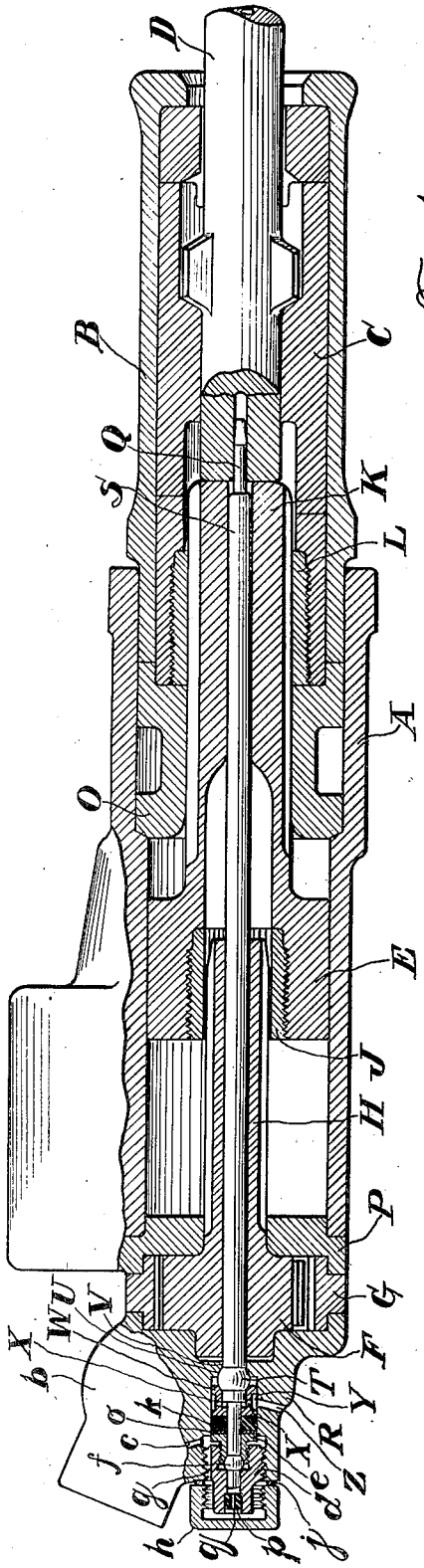
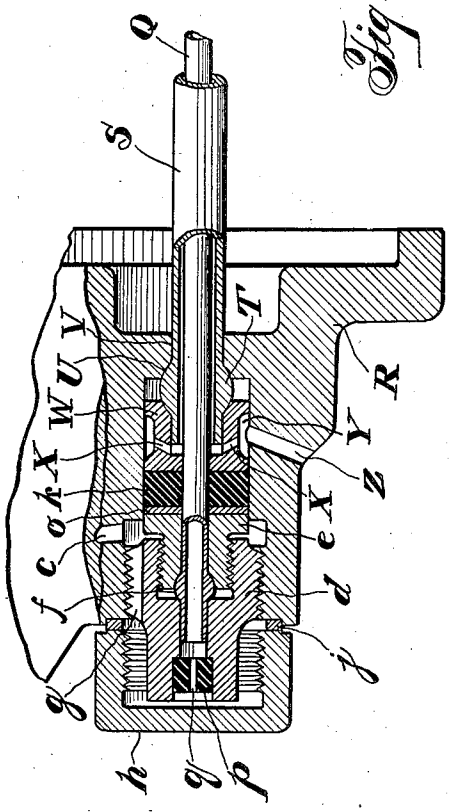


Fig. 3



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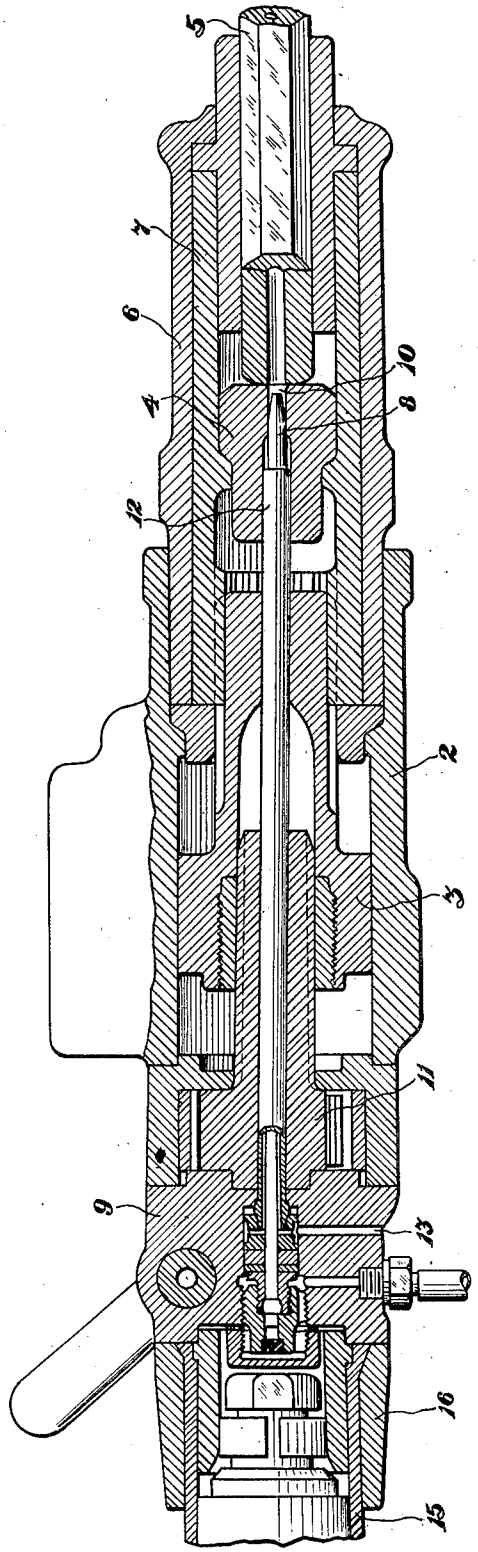

Fig. 2

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UNITED STATES PATENT OFFICE.

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ROCK DRILL.

Application filed August 1, 1924. Serial No. 729,482.

This invention relates to pneumatic rock drills and more particularly to that type of rock drill in which a tube is provided extending through the cylinder and hammer piston to supply cleansing water to the hollow bore of a drill steel.

In drills of this type it is often desirable to prevent compressed air from leaking from the cylinder into the front head and mixing with the water as it passes into the steel, for the reason that this air causes the formation of a mist carrying fine particles of dust which are sometimes considered dangerous to the health of the miner. It is an object of this invention to prevent air leaking into the front head parts of the drill from mixing with the cleansing water.

The invention will be understood by reference to the following description in the accompanying drawings in which,

Figure 1 is a longitudinal section through a rock drill embodying the invention,

Figure 2 is a longitudinal section through a stope drill showing the manner in which the invention is applied to a drill having an anvil block, and

Figure 3 is an enlarged view in longitudinal section of the back head in longitudinal section of the drill illustrated in Figure 1.

Referring to the drawing and more particularly to Figures 1 and 3 the rock drill comprises a cylinder A which supports at its forward end a front head B housing a chuck C to receive a hollow drill steel D adapted to be struck repeatedly by a reciprocatory hammer piston E within the cylinder A. Rotation of the steel D is effected by means of a suitable ratchet device F cooperating with a ratchet ring G at the rear end of the cylinder A and having a spirally fluted rifle bar H cooperating with a nut J in the hammer piston E. In order to transmit rotation to the steel D the piston E is provided with a forward extension K fluted to cooperate with a chuck nut L secured to the chuck C. The extension K of the piston E is guided at the forward end of the cylinder A by a front cylinder washer or bushing O which is additionally adapted to prevent leakage of compressed air from the forward part of the cylinder A into the interior of the chuck C. The flutes at the forward extension K of the piston are also adapted to fit closely to the flutes in the nut L so as to prevent excessive leakage into the chuck. The cylinder A is provided with a back cylinder washer P which seals the rear end and provides a bearing for the ratchet device.

In order to clear the cuttings from the hole being drilled, water under pressure is supplied to the hollow drill steel D by means of a tube Q extending from a back head R through the ratchet F and the piston E to the hollow bore of the drill steel D. In many cases it is desirable to prevent compressed air from mixing with the water fed to the drill steel for the reason that a mist or dust is formed which, when breathed by the operator, is dangerous to his health. In accordance with this invention, therefore, a vent is provided for allowing the compressed air to escape from the chuck cavity in front of the piston so as to prevent its mixture with the cleansing water. Vents have heretofore been provided for this purpose which extend through the chuck and front head to atmosphere. If the air is permitted to escape from the said chuck cavity in this manner it is apt to carry along with it the oil or other lubricant which is intended to be supplied to the rotating parts of the chuck beyond the vent. For this reason, additional lubricating means have been found desirable to prevent excessive wear of the parts in the forward end of the front head. In the preferred form of this invention, the vent is positioned so as to permit the escape of the air under pressure from a point in front of the piston close to the entrance to the drill steel D and relatively remote from the bearing between the front head B and chuck C so as to carry away as little lubricant as possible. To this end the vent permits the escape of the air rearwardly through the piston itself and includes a vent tube S surrounding the water tube Q and communicating with atmosphere through the back head R. The vent tube S extends substantially to the center bore of the drill steel D and therefore air under pressure finding its way to the end of the steel is provided with relatively free rearward access to atmosphere through the tube S and does not tend to enter the steel with the water from the water tube Q. The vent tube S has only sufficient clearance in the smallest bore of the piston to permit the piston to move back and forth on the tube.

Leakage air will not tend to pass rearwardly through this clearance because of the live pressure fluid intermittently supplied to the rear of the piston.

The manner in which the water tube Q is sealed from the vent tube S is shown in Figure 3. The tube S is provided close to its end with a bulb T which is adapted to be pressed between a seat U in a bore V of the back head R and a sleeve W fitting over the end of the tube S. The sleeve W is provided with radial holes X leading to an annular groove Y in the sleeve W through which the air passes to atmosphere out through a hole Z in the back head R. The water tube Q is adapted to be connected with a suitable source of supply associated with a hollow boss *b* preferably formed integrally with the back head R and associated to the interior of the back head by means of a hole *c*.

The water tube Q is mounted in a plug *d* and held therein by a bushing *e*. A bulb *f* is formed on the water tube Q which is adapted to hold the water tube from endwise movement and is clamped between the plug *d* and bushing *e*, the bushing being threaded into the plug. The interior of the back head R is threaded to receive the plug *d* which is provided with flat sides at its end to permit a wrench to be applied for screwing the plug in position. A longitudinal groove *g* provides connection between the holes *c* and the end of the plug *d* which is bored to allow the water to pass into the tube Q. A cap *h* encloses the plug *d* upon which it is adapted to be screwed and is provided with a gasket *j* to prevent leakage of water between the cap and the back head R. Leakage of water from the supply hole *c* into the tube S is prevented by a rubber washer *k* and a friction washer *o* interposed between the sleeve W and the bushing *e*. In order to restrict the supply of water into the water tube Q the bore of the plug *d* is provided with a bushing *p* having a small aperture *q* therethrough.

In Figure 2 there is illustrated a rock drill of the stope hammer type which is provided with an anvil block to seal the forward end of the cylinder. The rock drill includes a cylinder 2 within which a hammer piston 3 is adapted to reciprocate to deliver blows to an anvil block 4 in contact with the end of the hollow drill steel 5. A front head 6 is mounted on the end of the cylinder 2 and supports a chuck 7 which is adapted to guide the hollow drill steel 5. The water tube 8 is adapted to supply cleansing water from the back head 9 into the hollow bore 10 of the anvil block which is adjacent the hollow central bore of the drill steel 5. As in the embodiment shown in Figure 1 the water tube extends from the back head through the ratchet 11 and the piston 3.

Preferably, the anvil block 4 is arranged to fit closely in the chuck 7 to prevent leakage of air into the chuck. In this type of drill most of the leakage of air occurs around the water tube directly into the drill steel. In order to permit this leakage of air to pass rearwardly to atmosphere instead of entering the drill steel, the vent 12 in the form of a tube extending into and closely fitting the bore of the anvil block 4 communicates at the back head with atmosphere through a hole 13 and is adapted to educt the air leaking into the bore of the anvil block before reaching the end of the water tube 8. The water tube 8 and the vent 12 are preferably mounted in the back head 9 in the same manner as the water tube Q and the vent S, the same construction being employed for this purpose.

The drill illustrated in Figure 2 is provided with a feed cylinder 15 attached to the back head 9 and feeding of the drill is accomplished by admitting air into the feed cylinder in the usual manner.

I claim:

In a fluid actuated rock drill of the hammer type, the combination of a cylinder, a back head, a front head, a chuck having a chuck cavity into which a hollow drill steel is adapted to extend to receive the blows of impact of the hammer piston, a reciprocating hammer piston having a hollow bore, an inner tube extending through said hollow bore for supplying cleansing fluid to the drill steel, and a vent tube surrounding said inner tube and extending from the back head to the said chuck cavity, the rearward end of said vent tube being open to atmosphere, whereby the escape of leakage pressure fluid is continuously permitted rearwardly through said vent tube from a point in front of the piston close to the entrance to the drill steel.

In testimony whereof I have signed this specification.

FRED M. SLATER.