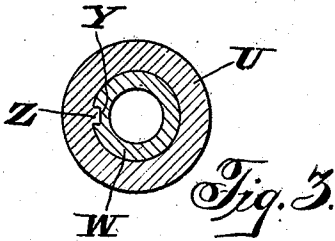
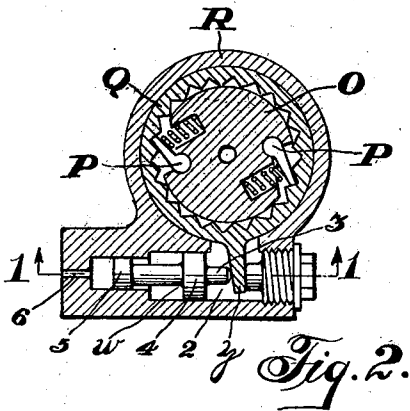
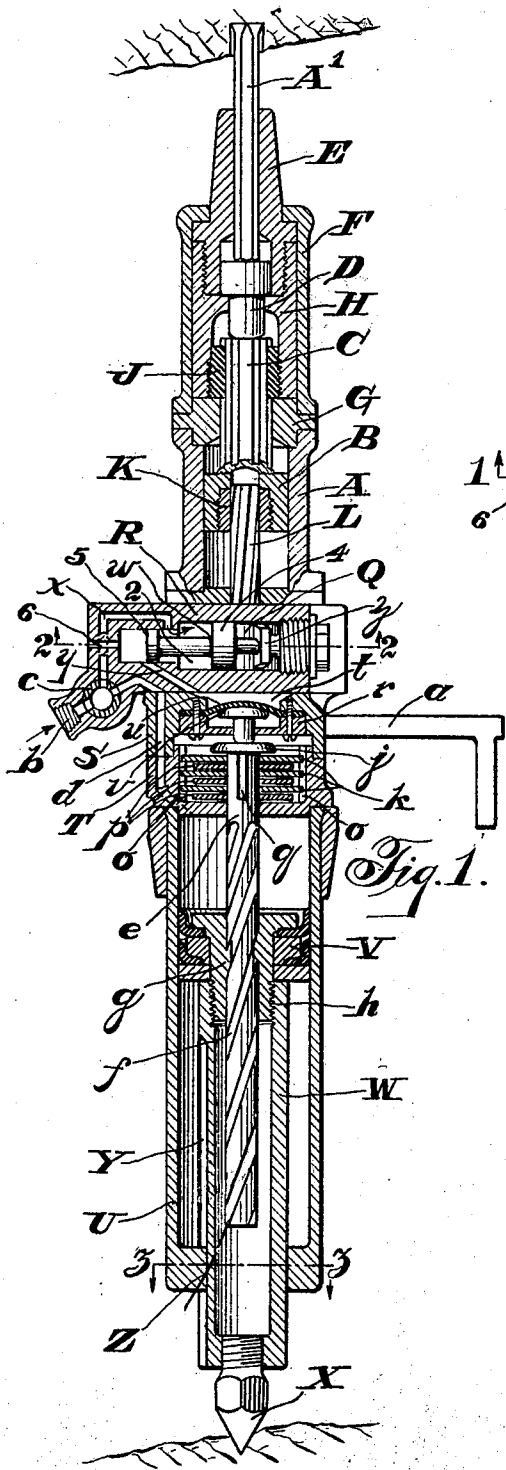


Jan. 6, 1925.

1,522,336

F. M. SLATER
AIR FEED BRAKE FOR ROCK DRILLS

Filed Oct. 12, 1922



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AIR-FEED BRAKE FOR ROCK DRILLS.

Application filed October 12, 1922. Serial No. 593,946.

To all whom it may concern:

Be it known that I, FRED M. SLATER, a citizen of the United States, and a resident of Easton, county of Northampton, and State of Pennsylvania, have invented a certain Air-Feed Brake for Rock Drills, of which the following is a specification accompanied by drawings.

This invention relates to fluid actuated rock drills, but more particularly to a brake for controlling the feeding element of a stope drill, although the invention may be applied to any drill having a fluid actuated feeding element.

The objects of the invention are to enable the members of the fluid actuated feeding element of a stope drill for instance, to be positively locked against relative movement when desired, or to enable a braking effect to be applied to the air feeding element in such manner that the forward feed of the machine may be checked or slowed down without actually locking the members against movement.

Another object of the invention is to secure an efficient braking device for the feeding element automatically controlled in accordance with the resistance to rotation encountered by the drill steel, in an automatically rotated rock drill.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a stope drill embodying the invention,

Figure 2 is a transverse sectional view on the line 2—2 of Figure 1, looking in the direction of the arrows, and

Figure 3 is a transverse sectional view of Figure 1 on the line 3—3, looking in the direction of the arrows.

Referring to the drawings, the invention is illustrated in connection with a stope drill of the hammer type having automatic rotation for the drill steel A', in this instance rifle bar rotation being shown. The cylinder A has a reciprocating piston B formed with a fluted forward extension C which imparts blows of impact to the anvil block D through which the blows are imparted to the drill steel A'. The shank of the drill steel extends into the chuck E carried in the front head F and a front cylinder washer G is interposed between the front head F and the cylinder A. The chuck E is connected to the chuck sleeve H having the

chuck nut J to which parts rotation is imparted by the rotating piston B. The piston has the usual rifle nut K engaging the rifle bar L which carries the rotation ratchet O having the usual pawls P adapted to engage the rotation ratchet ring Q in the back head R.

A head block S is interposed between the feed cylinder head T and the back head R, and the feeding element comprises two movable members consisting of the feed cylinder U and the piston V having the piston rod W provided with the rock engaging pointer X. The feeding element piston rod W is preferably in non-rotatable engagement with the cylinder U and for this purpose, the piston rod may be provided with the longitudinal groove Y engaging a rib Z on the cylinder.

The head block S of the rock drill is provided with the usual handle *a* commonly called the rotation handle, which is adapted to be grasped by the hand of the operator during the drilling operation. Fluid pressure is supplied to the machine through the inlet *b* in the back head R controlled by a suitable throttle valve *c*. From the throttle valve a passage *d* extends through the back head R, head block S and feed cylinder head T, to the feed cylinder for supplying fluid pressure to the feeding element. The parts of the machine comprising the casing are adapted to be held together by suitable side bolts, not shown. The braking device for the feeding element in this instance includes a longitudinally movable and rotatable member, which may be in the form of a brake rod *e* having a screw threaded shank *f* engaging a threaded sleeve *g* held within the feed piston V and preferably serving to connect the piston to the piston rod W, as by means of the threads *h*. Interposed between the head *j* of the brake rod *e* and the feed cylinder head T are two series of relatively longitudinally movable brake discs, one series of discs *k* being keyed to the feed cylinder head T, as by means of the ribs *o*, and the other series of discs *p* being keyed to the rotatable brake rod *e* as by means of the key *q*. A partition *r* is provided in the head block S forming a pressure chamber *t* and a flexible diaphragm *u* is preferably located in said chamber over a button or plunger *v* which extends through the partition *r* and is adapted to bear upon the head *j* of the

brake rod *e*. Fluid pressure applied to the chamber *t* above the diaphragm *u* will depress the plunger *v* and force the head *j* of the brake rod *e* down upon the braking discs *k* and *p* thus pressing said discs together and checking or preventing rotation of the brake rod *e* according to the pressure applied to the diaphragm *u*. As the brake rod *e* is adapted to move longitudinally with the feed cylinder *U* and at the same time rotate, it is obvious that the feeding of the machine may be controlled by controlling the freedom of rotation of the brake rod.

In order to automatically control the rotation of the brake rod, and the application of the brake in accordance with the resistance to rotation of the drill steel *A'*, I prefer to provide a valve *w* in the back head *R* controlling fluid passages *x* and *y* leading from the throttle valve *c* to the pressure chamber *t* above the diaphragm *u* and I provide means for actuating said valve *w* from the rotation ratchet ring *Q*. For this purpose, the ratchet ring *Q* is provided with an arm or finger *z* extending into the valve chamber *2* and adapted to bear upon the end *3* of the valve *w*, so that when the resistance to rotation becomes sufficiently great, the ratchet ring *Q* will be forced in the back head and the finger *z* will force the valve *w* in a direction to open communication between the passages *x* and *y*, and thus admit fluid pressure to the chamber *t* to force the diaphragm *u* downwardly, which will apply pressure to the brake discs and either lock the rotatable brake rod *e* against rotation or permit slow rotation of the brake rod in the sleeve *g*, thus preventing or checking the operation of the feeding element. The valve *w* is preferably provided with differential pressure areas formed by the enlarged head *4* and the smaller head *5* so that when the resistance to rotation of the drill steel is again reduced sufficiently and the automatic rotation device assumes normal operation, the fluid pressure against the enlarged head *4* of the valve will restore the valve to normal position as indicated in the figures, and cut off the supply of pressure to the chamber *t*. A vent *6* is preferably provided in the back head *R*, opposite the outer end of the smaller head *5* of the valve *w*, through which vent pressure fluid is exhausted from the chamber *t* past the head *5* after the valve *w* is returned to its normal position.

It is to be assumed throughout the operation of the machine described, that the operator retains his hand on the rotation handle *a*, so that the entire machine is prevented from rotating bodily about the pointer *X* and by this means, the operator holds the entire machine against bodily rotation and sufficient increase in resistance to rotation of

the drill steel will then carry the rotation ratchet ring *Q* against the valve *w* as described and automatically apply the braking device to the feeding element.

I claim:

1. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one of said members being connected to said cylinder, a fluid actuated brake associated with said feeding element for checking and preventing the relative movement of said members, and automatic means for controlling the operation of said brake in accordance with the resistance to rotation encountered by the drill steel.

2. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other member and a fluid actuated brake for checking and preventing rotation of said brake rod in accordance with the resistance to rotation encountered by the drill steel.

3. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other member and a fluid actuated brake interposed between said rotatable members of the feeding element for checking and preventing rotation of said brake rod in accordance with the resistance to rotation encountered by the drill steel.

4. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other member, a series of discs carried by one of the said relatively movable members of the feeding element, another series of discs interposed between said first series of discs and carried by the rotatable brake rod and fluid actuated means for forcing the discs of said series together to check or prevent rotation of the brake rod in accordance with the resistance to rotation encountered by the drill steel.

5. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other

member, a fluid actuated brake for preventing and checking rotation of said brake rod, and means for automatically controlling said brake in accordance with the resistance to rotation encountered by the drill steel.

6. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other member, a fluid actuated brake interposed between said rotatable members of the feeding element for checking and preventing rotation of said brake rod, and means for automatically controlling said brake in accordance with the resistance to rotation encountered by the drill steel.

7. In a fluid actuated rock drill having automatic rotation for the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other member, a series of discs carried by one of the said relatively movable members of the feeding element, another series of discs interposed between the said first series of discs and carried by the rotatable brake rod, fluid

actuating means for forcing the discs of said series together to check and prevent rotation of the brake rod, and means for automatically controlling said brake, in accordance with the resistance to rotation encountered by the drill steel.

8. In a fluid actuated rock drill having means for automatically rotating the drill steel, the combination of a cylinder, a fluid actuated feeding element having relatively movable members, one being connected to said cylinder, a rotatable brake rod movable with one of said members and engaging the other member, a series of discs carried by one of said relatively movable members of the feeding element, another series of discs interposed between the said first series of discs and carried by the rotatable brake rod, a plunger adapted to bear on one end of said brake rod, fluid actuated means for actuating said plunger to apply pressure to said discs to check and prevent the rotation of said brake rod, a valve controlling the admission of pressure fluid to said fluid actuated means and means associated with said automatic rotation means for controlling the movement of said valve.

In testimony whereof I have signed this specification.

FRED M. SLATER.