June 30, 1925. 1,543,883

F. M. SLATER

AUTOMATIC AIR FEED REGULATOR FOR ROCK DRILLS

Filed Nov. 2, 1921

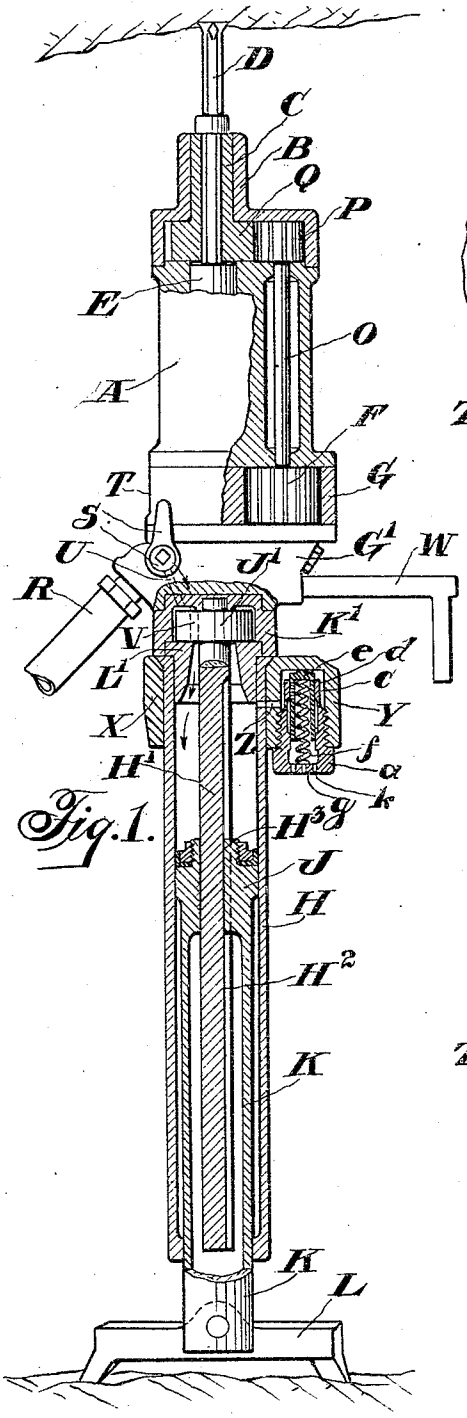


Fig. 1.

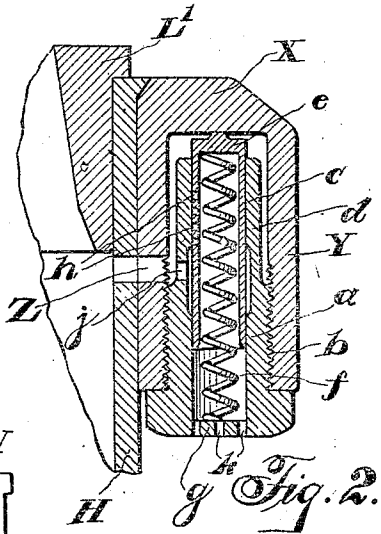


Fig. 2.

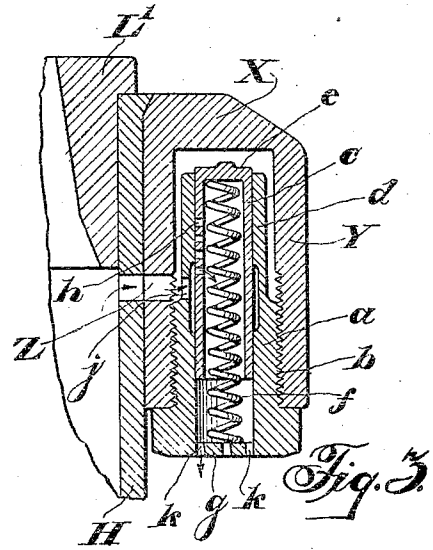


Fig. 3.

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UNITED STATES PATENT OFFICE.

FRED M. SLATER, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

AUTOMATIC AIR-FEED REGULATOR FOR ROCK DRILLS.

Application filed November 2, 1921. Serial No. 512,188.

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 Automatic Air-Feed Regulator for Rock Drills, of which the following is a specification, accompanied by drawings.

This invention relates to fluid actuated rock drills of the hammer type, which may or may not have automatic rotation, but relates more particularly to automatic regulation of the pressure in the feeding element of such rock drills.

This feeding element may be an air feed piston and cylinder, or other fluid actuated device and the objects of the invention are to enable the pressure in the feeding element to be automatically regulated by means controlled by the pressure in the said element itself, preferably without varying the supply to the feeding element.

To these ends the invention consists of the device shown in one of its preferred forms in the accompanying drawings, in which

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

Figure 2 is an enlarged detail longitudinal sectional view of the regulating valve shown in one position, and

Figure 3 is a similar view showing the valve in another position.

Referring to the drawings, a stope drill is illustrated in the figures having the cylinder A and front head B provided with the rotation sleeve C through which the drill steel D extends in position to receive the impact blows of the hammer E. An independent fluid actuated rotation motor is provided in this instance for rotating the drill steel, a gear motor being indicated, having the gears F, only one of which is shown in Figure 1, in the motor casing formed by the back end portion G of the cylinder. A head block G′ is located between the cylinder portion G and the head K′ of the fluid pressure cylinder H, which is provided with the piston J and piston rod K, having the rock engaging foot L. The cylinder A, back end portion or motor casing G, head block G′ and feed cylinder H are suitably held together as by means of the usual through bolts (not shown). One of the gears F of the motor, is operatively connected through a suitable shaft O and pinion P, meshing with the gear Q on the rotation sleeve C, for rotating the drill steel.

A rod H′ having the head J′ held between the bushing L′ and the head K′, of the feed cylinder, is slidably but non-rotatably connected to the piston J in any suitable manner, as by means of the rib H^2 operating in a corresponding groove H^3 in the said piston. By this means the feed cylinder and parts carried thereby cannot rotate relative to the piston J and piston rod K.

Fluid pressure, as live air, is supplied to the machine at the inlet R and is controlled by a suitable throttle valve S, having the usual handle T. Fluid passes to the feed cylinder H through the passages U and V as indicated by the arrows. A rotation handle W is suitably mounted on the head block G′.

In order to provide means controlled by the pressure in the feeding element for automatically regulating the feed pressure, I prefer a valve construction, one form of which is illustrated in the drawings. A sleeve X is mounted at the upper end of the feed cylinder H formed with a suitable valve chest Y at one side communicating with the interior of the feed cylinder through the passage Z. A valve plug or cage *a* is suitably secured within the valve chest Y as by means of the screw threads *b*, and within the valve cage *a*, a slidable cylindrical valve *c* controls the exhaust from the feed cylinder.

As shown, the inner portion *d* of the valve cage or plug, is of reduced diameter, so that the head *e* of the valve is subjected to the pressure in the feed cylinder. A suitable spring *f* within the valve, bearing against the end *g* of the valve plug, opposes the fluid pressure on the valve head *e* and tends to maintain the valve closed, as shown in Figure 2. The valve is provided with a series of ports *h* in its walls and the valve cage is provided with a port *j* so that when the pressure within the feed cylinder H exceeds the pressure of the spring *f*, the valve *c* will be moved longitudinally as indicated in Figure 3, and bring one or more of the ports *h* into position to permit fluid pressure to pass from the feed cylinder H through the passage Z, port *j* and one or more of the ports *h* to the outlet ports *k* in the end *g* of the valve plug. As the pressure in the feeding element is reduced, the spring *f* will again close

the valve, until opened by fluid pressure, so that the feed pressure will be regulated without varying the supply of fluid pressure to the feeding element.

I claim:

An automatic air feed regulator valve for rock drills adapted to be controlled by the pressure fluid in the feeding element, comprising a valve chest open at one end and mounted at one side of the cylinder of the feeding element, a passage at the side of the valve chest affording communication between the valve chest and feed cylinder, a valve cage in the form of a hollow cylindrical plug, having an inner portion of reduced diameter removably secured within the open end of the valve chest, an atmospheric port in the outer end of the valve cage, a hollow cylindrical valve closed at its inner end forming a head and slidable within the valve cage, and a valve having a series of ports in its walls adapted to cooperate with the passage at the side of the valve chest, and a spring within the valve opposing the pressure fluid exerted on the valve head, whereby one or more of the valve ports are brought into communication with the feed cylinder passage in accordance with the pressure in the cylinder.

In testimony whereof I have signed this specification.

FRED M. SLATER.