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FEEDING DEVICE FOR ROCK DRILLS

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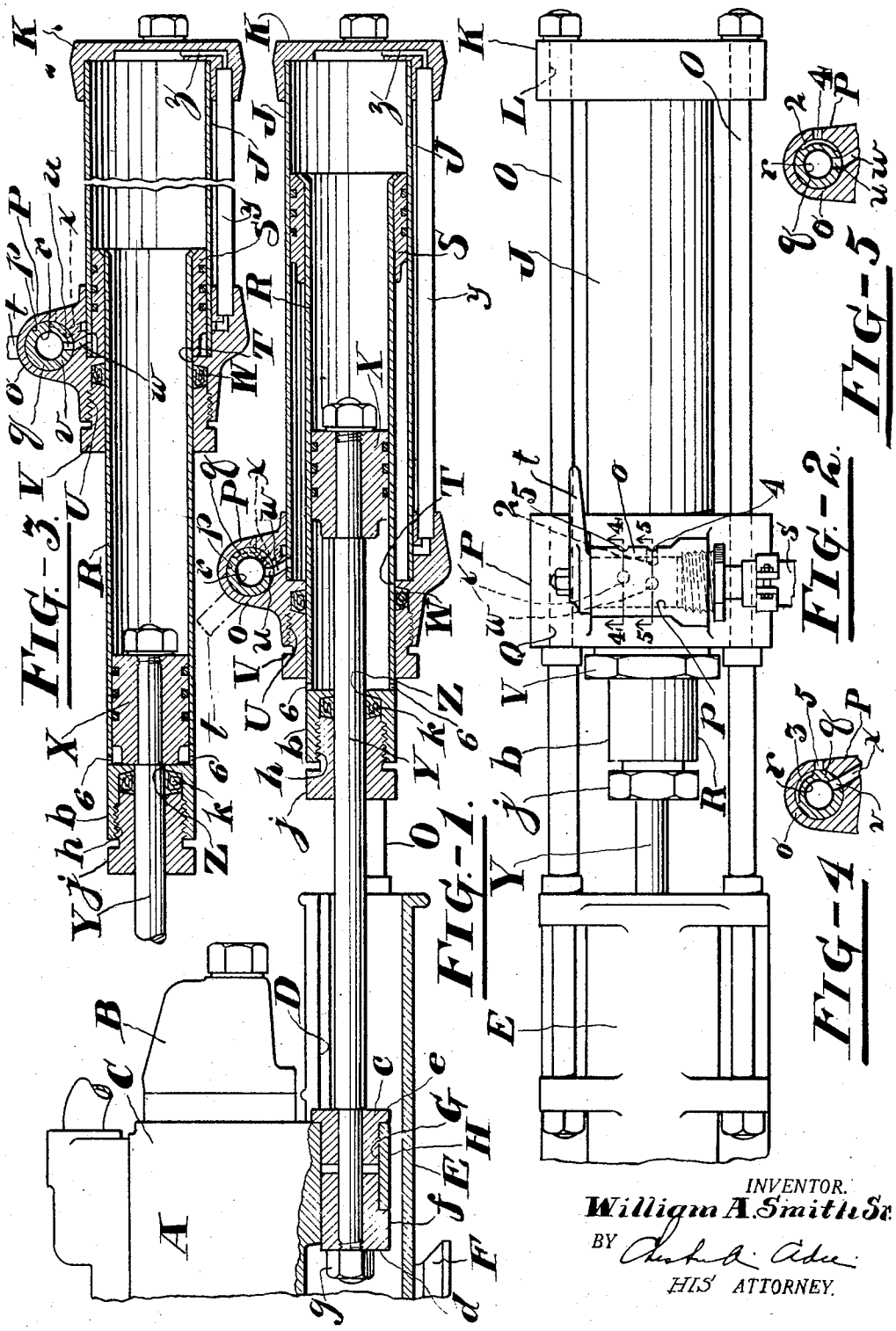


FIG.-1.

FIG.-2.

FIG.-3.

FIG.-4

FIG.-5

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FEEDING DEVICE FOR ROCK DRILLS

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This invention relates to rock drills, but more particularly to a feeding device for fluid actuated rock drills of the drifter type.

The objects of the invention are to insure an adequate and uniform pressure on the working implement during the drilling operation and to facilitate the operation of withdrawing the drill from the work.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings illustrating a practical application of the invention and in which similar reference characters refer to similar parts,

Figure 1 is a longitudinal elevation, partly in section, of a rock drill and its shell having the invention applied thereto.

Figure 2 is a top plan view of the feeding device,

Fig. 3 is a view similar to Figure 1 showing the feeding device fully extended,

Figure 4 is a sectional detail view taken through Figure 2 on the line 4—4 looking in the direction indicated by the arows, and

Figure 5 is a similar view taken on the line 5—5 of Figure 2.

Referring to the drawings, A designates generally a rock drill of which only the back head B and a portion of a percussive cylinder C are shown. The rock drill illustrated is intended to be one of the drifter type in which the cylinder C is provided with the shell guides (not shown) but which are adapted to be in slidable engagement with guideways D of a shell E whereby the drill is supported.

The shell E may be of the well known type having a coniform extension F whereby the shell may be clamped to a drill column or other support.

In drilling mechanism such as that illustrated, it is customary to provide the shell E with a feed screw for actuating the rock drill A with respect to the shell E. The feed screw is usually anchored to the front end of the shell E and extends through an aperture G of a lug H formed integrally with the cylinder C. The aperture G serves as a seat for a feed screw nut which may be suitably secured to the lug H and is in threaded engagement with the feed screw.

In devices of this type the feed screw is provided with a suitable handle at its rearward end to enable the feed screw to be manually rotated for advancing and retracting the rock drill A. One objection to this method of actuating the rock drill is that it is necessary for the operator to maintain a constant grasp on the feed screw crank in order to assure the correct position of the percussive element with respect to the working implement which it is adapted to actuate. In certain types of rock drills in which the drilling speed is comparatively low this may not be objectionable, but in rock drills operating at high speeds the vibration incident to drilling is terrific. The constant jars and shocks frequently result in bruises to the operator's hand and at best make it practically impossible for an operator to grip the crank handle for any prolonged period of time.

The present invention is particularly adapted to eliminate the exposure of the operator to such vibration and to this end means are provided for advancing and retracing the rock drill towards and from the work by suitable pressure actuated means. This means comprises a feeding cylinder J having a head K at its rearward end in which are formed holes L for the reception of the shell standards O attached to the rearward end of the shell E. At the forward end of the feeding cylinder J is a front head P which may be suitably secured to the feeding cylinder J and is also provided with holes Q through which the shell standards O extend.

In devices of the type to which the present invention pertains it is desirable that the entire structure be maintained as compact as possible. The feeding cylinder J is accordingly provided with a feeding cylinder extension R adapted to extend slidably into the feeding cylinder J and is provided with a head S in slidable engagement with the wall of the feeding cylinder J. The bore T in the front head P through which the extension R extends is threaded at its outward end as at U to receive a gland nut V for compressing packing W disposed in the bore T.

Disposed within the feeding cylinder ex-

tension R is a piston X having a rod Y suitably connected thereto and said rod extends through a bore Z in a head *b* at the forward end of the extension R. The opposite end of the rod Y extends through the bushings *c* and *d* disposed in the aperture G of the lug H. The bushings *c* and *d* are substituted for the usual feed nut hereinbefore mentioned and have flanges *e* and *f* respectively which abut the ends of the lug H against which they are firmly drawn by a nut *g* threaded on the rod Y to act against the bushing *d*.

To the end that the forward end of the extension R may be suitably sealed to prevent the escape of pressure fluid along the rod Y the outward portion of the bore Z is somewhat enlarged and threaded as at *h* to receive a gland nut *j* for compressing the packing *k* in the enlarged portion of the bore Z and encircling the rod Y.

Separate valve means are preferably provided for controlling the admission of pressure fluid to the rock drill A and to the feeding device. Accordingly, the front head P is provided with a boss *o* in which is formed a valve chamber *p* wherein is disposed a throttle valve *q*. The throttle valve *q* in this instance has a central chamber *r* which may be in constant communication with a source of pressure fluid supply through a coupling or hose *s* secured to the boss *o*. The throttle valve *q* is of the rotatable type and is provided with the usual lever *t* for its manipulation.

In the wall of the throttle valve are a pair of ports *u* and *v*. The port *u* is adapted to register with an inlet passage *w* leading to the front end of the feeding cylinder J, and the port *v* registers with an inlet passage *x* leading through the head P and communicating with a tube *y* which is supported at its ends by the heads P and K. A passage *z* in the head K affords communication between the tube *y* and the rearward end of the feeding cylinder J.

In the same transverse plane as the ports *u* and *v* of the throttle valve are formed peripheral grooves 2 and 3 respectively. These grooves 2 and 3 are adapted to establish communication between the passages *w* and *x* and exhausts ports 4 and 5 in the boss *p* for exhausting pressure fluid from the feeding cylinder to the atmosphere.

In order to supply pressure fluid to the front end of the extension R ports 6 are formed in the front end of the extension adjacent the head *b* so that when the extension is approximately fully retracted pressure fluid may flow from the inlet passage *w* through the port 6 into the front end of the extension.

The operation of the device is as follows: Let it be assumed that the rock drill A occupies its rearwardmost limiting position with respect to the shell E. In this position of the rock drill the extension R will occupy a similar position with respect to the feeding cylinder J and the piston X will occupy a like position with respect to the extension R. If then the throttle valve *q* be rotated to a position in which the port *v* registers with the inlet passage *x* pressure fluid will pass through the passage *x*, the tube *y* and the passage *z* into the rearward end of the feeding cylinder J. Such pressure fluid may have the effect of advancing both the extension R and the piston X to carry the rock drill A in the direction of the work.

As the drill steel progresses into the rock the extension R and the piston X may gradually advance in unison until the head S of the extension is forced into engagement with the head P of the feeding cylinder J. The pressure fluid acting against the rearward end of the head S will then hold the extension R securely in its forwardmost position and will act against the rearward end of the piston X and continue to force the rock drill A forwardly in accordance with the penetration of the drill steel into the work.

After a drill hole of the desired depth has been drilled or when the feeding device has reached the limit of its travel in a forwardly direction the throttle valve *q* may be rotated to a position in which the port *u* will register with the inlet passage *w*. At the same time the groove 3 will also establish communication between the inlet passage *x* and the exhaust port 5 to enable the pressure fluid used for driving the drill forwardly to be exhausted to the atmosphere. In this position of the throttle valve *q* pressure fluid will flow through the inlet passage into the front end of the feeding cylinder to act against the head X so that the extension R will be moved rearwardly into the feeding cylinder J.

As the extension R approaches its rearwardmost limiting position the port 6 will move into communication with the front end of the feeding cylinder J. Pressure fluid will then flow through this port 6 into the front end of the extension R and, acting against the front end of the piston X, will again force said piston together with the rock drill A rearwardly to the initial position.

When it is again desired to advance the drilling mechanism the throttle valve *q* may be rotated to establish communication between the interior of the throttle valve and the rearward end of the feeding cylinder. In this position the groove 2 will be moved to a position in which it establishes communication between the inlet passage *w* and the exhaust port 4 for exhausting the pressure fluid previously used for retracting the drilling mechanism.

I claim:

1. In a drill feeding device, the combination of a rock drill and a cylinder therefor, a shell whereon the rock drill is slidably mounted, a lug on the cylinder extending into the

shell, standards on the shell, a feeding cylinder fixedly secured to the standards and having a front and rear head, a feeding cylinder extension in the feeding cylinder and having a head in slidable engagement with the feeding cylinder, a piston in the extension, a rod for the piston fixedly secured to the lug, a valve chamber in the front head, an inlet passage leading from the valve chamber and including a tube supported by said front and rear heads to convey pressure fluid to the rearward end of the feeding cylinder to act against the head and the piston for actuating the rock drill toward the work, an inlet passage leading from the valve chamber for conveying pressure fluid to the front end of the feeding cylinder to act against the head for retracting the extension, ports in the extension to register with the last said inlet passages for admitting pressure fluid into the extension to act against the piston for retracting the rock drill, and a throttle valve in the valve chamber to control the inlet passages.

2. In a drill feeding device, the combination of a rock drill and a cylinder therefor, a shell whereon the rock drill is slidably mounted, a lug on the cylinder extending into the shell, standards on the shell, a feeding cylinder for the rock drill, front and rear heads on said feeding cylinder having apertures to receive the standards, means on the standards to maintain said heads fixedly to the feeding cylinder, a feeding cylinder extension in the feeding cylinder having a head in slidable engagement with the feeding cylinder, a piston in the extension, a rod for the piston secured fixedly to the lug, a valve chamber in the front head, a tube between the front and rear heads communicating with the rearward end of the feeding cylinder, an inlet passage in the front head leading from the valve chamber to said tube for conveying pressure fluid for actuating the rock drill to the work, an inlet passage leading from the valve chamber for conveying pressure fluid to the front end of the feeding cylinder to act against the head for retracting the extension, ports in the extension to register with the last said inlet passages for admitting pressure fluid into the extension to act against the piston for retracting the rock drill, and a throttle valve in the valve chamber to control the inlet passages.

In testimony whereof I have signed this specification.

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