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AIR FEED CONTROLLING DEVICE

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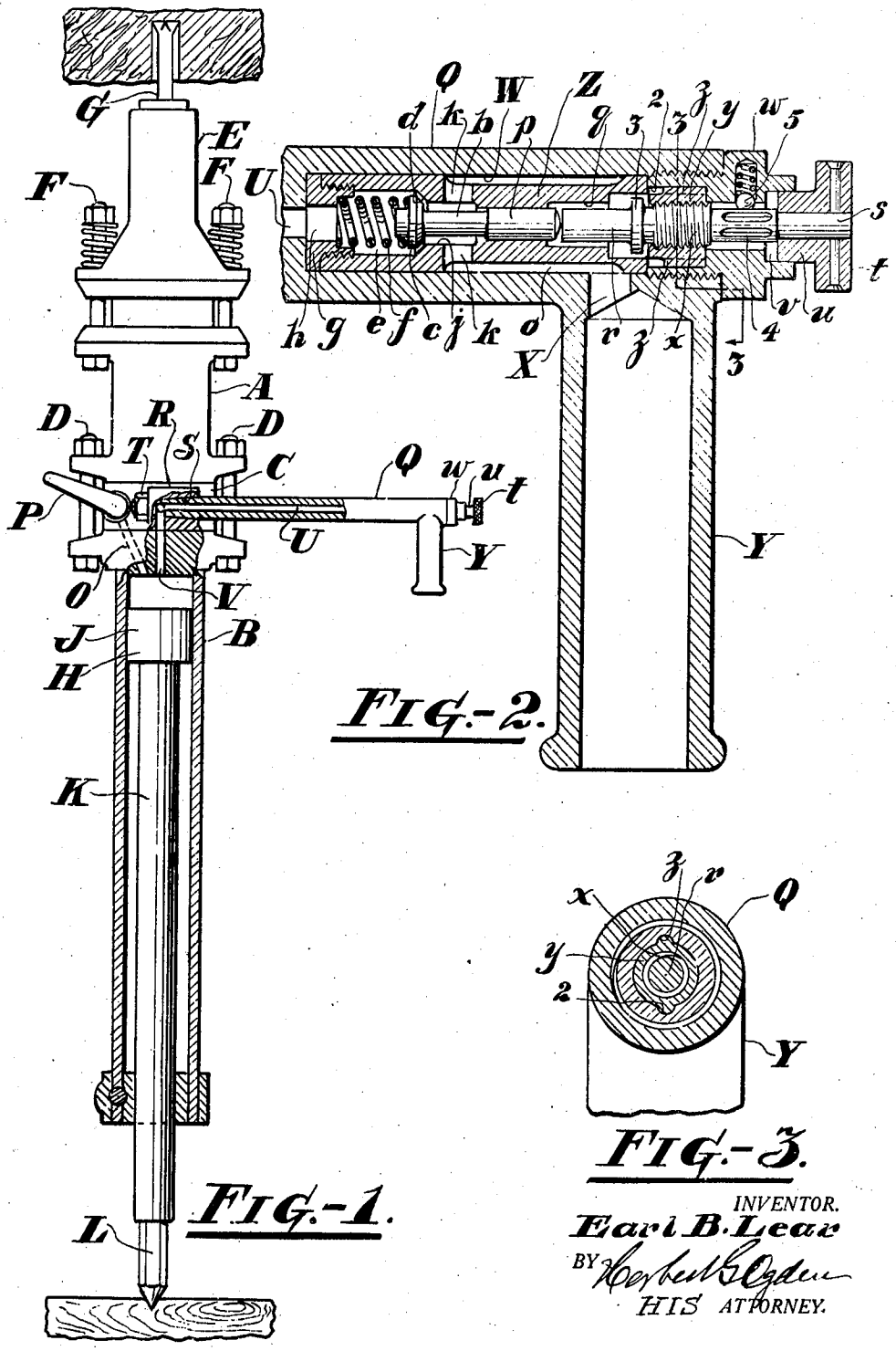


FIG.-2.

FIG.-3.

FIG.-1.

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AIR-FEED-CONTROLLING DEVICE

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This invention relates to fluid actuated rock drills and more particularly to a feed controlling device for the feeding element of rock drills of the stoper type.

The objects of the invention are to enable the air feed controlling means to be opened to a desired degree and maintained fixedly in that position unaffected by the vibration incident to drilling and also to enable the controlling means to be instantly opened to wide limits whenever conditions in the drill hole require an immediate relaxation of pressure used for advancing the rock drill in the direction of 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,

Figure 1 is an elevation, partly in section, of a stoper type rock drill having the invention applied thereto,

Figure 2 is an enlarged sectional elevation of a portion of the rotation handle showing a detailed view of the controlling device, and

Figure 3 is a transverse view taken through Figure 2 on the line 3—3 looking in the direction indicated by the arrows.

Referring more particularly to the drawings, the invention is shown embodied in a rock drill of the stoper type in which a percussive cylinder A, a feeding cylinder B and a head block C interposed between the cylinders are held in operative relation with respect to each other by side bolts D. At the front end of the percussive cylinder A is disposed a front head E which is secured to the cylinder A by spring pressed side bolts F and serves as a guide for a drill steel G extending through the front head into the path of a hammer piston (not shown) in the cylinder A.

Disposed within the feeding cylinder B is a piston H comprising a head J and a feeding rod K which projects through the free end of the cylinder B and carries a point L for engagement with a mine floor or other suitable form of support.

The admission of pressure fluid to the feeding cylinder B is effected through a passage O which leads through the upper portion of the feeding cylinder and through the head block C to a throttle valve (not shown) but the position of which is indicated by a lever P.

The rock drill is provided with the usual rotation handle Q preferably secured to the head block C which in this instance carries a lug R having an aperture S for the reception of the rotation handle Q. The end of the rotation handle projects beyond the lug R and may be threaded to receive a nut T whereby the rotation handle Q is clamped securely in position.

In accordance with the present invention, the rotation handle Q is provided with a longitudinal passage U which registers at its inner end with the passage V in the head block C and the end of the cylinder B and opens into the said cylinder. The outermost end of the passage U in this instance is enlarged to form a recess W, a portion of which is in constant communication with the atmosphere through a passage X in a perpendicularly disposed grip portion Y formed integrally with the rotation handle Q and preferably located near its outermost end.

Suitable means are provided for controlling the outlet opening of the passage U. To this end a bushing Z is disposed in the recess W and is bored to receive slidably a relief valve *b* having a tapered head *c* to cooperate with a correspondingly tapered seat *d* formed in the bushing for normally preventing the escape of pressure fluid from the passage U. The tapered seat *d* is in this instance formed at the rearward end of a recess *e* in the innermost end of the bushing Z. In the recess *e* is disposed a spring *f* which bears with one end against the relief valve *b* and with its other end against a plug *g* threaded into the bushing Z. The plug *g* is provided with a passage *h* which registers with and forms a continuation of the passage U in the rotation handle.

In order to permit the escape of such pressure fluid as may be released from the feeding cylinder to the atmosphere, the bushing Z is recessed as at *j* forwardly of the

valve seat *d* and ports *k* afford communication between the recess *j* and an annular external grove *o* in the bushing Z, said external groove *o* being of a length to overlap the passage X in the grip portion Y.

The relief valve *b*, being of the poppet type, has the usual stem *p* which extends with its rearward end into a recess *q* in the bushing Z and normally abuts the inner end of a push rod *r* of such length as to extend with its opposite end beyond the outermost or free end of the rotation handle Q. On the end *s* of the push rod *r* may be disposed any suitable means, such as a button *t* conveniently formed to receive the pressure of the operator's fingers for sliding the push rod longitudinally of the bushing Z thus unseating the relief valve *b*.

The button *t* in this instance has an inwardly extending projection *u* which extends slidably into a recess *v* of a cap *w* threaded in the end of the rotation handle Q to prevent endwise movement of the bushing Z. The recess *v* may be of such depth as to determine the degree of inward movement of the push rod *r* so that when the push rod is actuated to open the relief valve *b* to its maximum limit, the end of the projection *u* will contact with the bottom of the recess *v* and thus act as a stop for the push rod *r*.

The push rod *r*, however, is not limited to the particular form of movement described, and additional means are provided to enable the relief valve to be unseated by rotative movement of the push rod *r* as well as to enable the relief valve to be opened to a desired degree and be held fixedly in any desired position without requiring the operator to constantly maintain his hold on the button *t*. To this end the push rod *r* is provided with a threaded portion *x* which engages a nut *y* disposed slidably in the inner end of the cap *w*. Any suitable means may be provided for preventing rotation of the nut *y* with respect to the cap *w*. The means provided for this purpose in this instance consists of a pair of ribs *z* carried by the nut *y* and engaged slidably by grooves 2 in the cap *w*. Preferably a flange 3 is formed on the push rod *r* near the threaded portion *x* to prevent unscrewing of the push rod from the nut *y*.

In order to securely hold the push rod *r* against accidental unscrewing of the nut *y*, said push rod is provided with a series of longitudinal notches 4 in its periphery near the end *s* of the push rod to engage spring pressed means such as a ball 5 seated in the cap *w*.

The operation of the device is as follows: Pressure fluid flowing into the feeding cylinder B through the passage O will act against the end of the feeding cylinder and the piston H to advance the percussive element of the drill towards the work and obtain a suitable pressure on the working implement G to insure the best drilling results. In rock of uniform degree of hardness substantially the same pressure may be maintained at all times in the feeding cylinder B. However, as sometimes happens in drilling earth formations, strata of unusual hardness are encountered by the working implement G, or pockets of soft material may lie in the course of the working implement. In either case it is essential that the pressure in the feeding cylinder B be reduced. This may be accomplished in the present instance by merely pressing against the button *t* and sliding the push rod *r* together with the nut *y* in an inwardly direction to unseat the relief valve *b* to a point which will allow sufficient pressure fluid to escape from the feeding cylinder to obtain the desired result. If, however, the abnormal formations in the material being drilled are of considerable magnitude and it would be burdensome for the operator to maintain a long pressure on the button *t*, the push rod *r* may be rotated in the direction of the relief valve *b* and as will readily be understood, this will also have the effect of opening the relief valve *b*. When rotated, however, the push rod *r* will remain in the position to which it has been threaded and thus hold the relief valve *b* fixedly in an open position unaffected by the vibration of the rock drill.

If, after the relief valve *b* has been opened by rotating the push rod in the manner described, conditions in the drill hole would require an immediate maximum release of the pressure fluid in the feeding cylinder, the operator may open the valve *b* to its wide limit by merely pressing against the button *t* and holding it thus until a greater pressure may again be permitted in the feeding cylinder. The button *t* may then be released and the relief valve *b* will again return to the same open position which it previously occupied.

During the time that a prolonged exhaust from the feeding cylinder is taking place, the push rod *r* will be held against accidental unscrewing by the spring pressed ball 5 which will be in engagement with one of the notches 4.

Among other advantageous features, the present invention eliminates the necessity of constantly maintaining a hold on the releasing element during a long period of reduced pressure in the feeding cylinder. This is due to the manner in which the relief valve *b* may be set in an open position for any required period of time, although when conditions require the relief valve may be instantly opened to wide limits by merely pressing against the push rod.

I claim:

1. In a feed controlling device for fluid actuated rock drills, the combination of an element to be controlled and a source of pressure fluid supply communicable with the element to be controlled, a rotation handle having a relief passage communicating with the element to be controlled, a bushing, in the rotation handle, a relief valve in the bushing controlling the passage, a nut slidable in the rotation handle, means formed separately from the valve and threaded in the nut for unseating the relief valve and maintaining said relief valve in its open position unaffected by the vibration incident to drilling and a spring to close said valve.

2. In a feed controlling device for fluid actuated rock drills, the combination of an element to be controlled and a source of pressure fluid connected thereto, a rotation handle, an integral grip portion thereon, said rotation handle having a recess and a passage opening into the recess and constantly communicating with the element to be controlled, a bushing in the recess forming a valve guide, a cap threaded in the recess to hold the bushing against endwise movement, a spring pressed relief valve in the bushing for controlling the passage, a nut longitudinally slidable in the cap, means for holding the nut against rotation with respect to the handle, and a push rod threaded into the nut bearing against the relief valve to open the relief valve to a desired degree and maintain said relief valve fixedly in such open position, said push rod projecting from the handle to enable pressure to be applied thereto for slidably actuating both said push rod and the nut for further opening the valve.

In testimony whereof I have signed this specification.

EARL B. LEAR.