

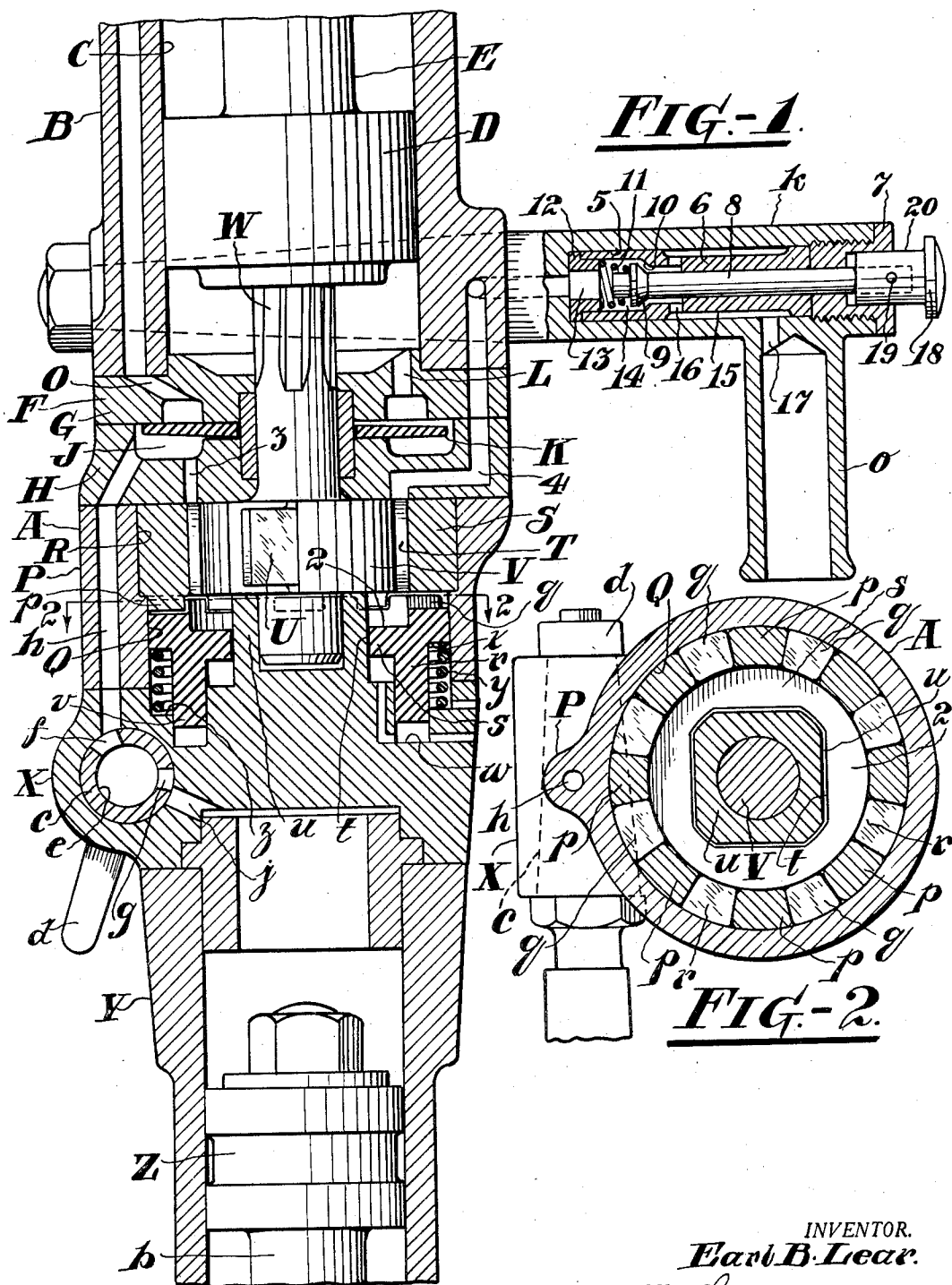
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SAFETY DEVICE FOR ROCK DRILLS

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1,944,247

SAFETY DEVICE FOR ROCK DRILLS

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1 Claim. (Cl. 121—7)

This invention relates to rock drills, but more particularly to a safety device for fluid actuated rock drills of the stopper type having rotation mechanism for shifting the working implement in the drill hole and in which the hammer piston of the drill and a rifle bar interlockingly engaged thereby serve as a means for rotating the working implement.

One object of the invention is to assure an immediate release between the rotation mechanism and the stationary elements of the drill which act as an abutment therefor whenever the working implement becomes stuck in the drill hole and in which case the rock drill, as ordinarily constructed, tends to rotate about the working implement.

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

In the drawing accompanying this specification and forming a part thereof and in which similar reference characters refer to similar parts,

Figure 1 is a sectional elevation of a portion of a rock drill of the stopper type equipped with a safety device constructed in accordance with the practice of the invention, and

Figure 2 is a transverse view taken through Figure 1 on the line 2—2 looking in the direction indicated by the arrows.

Referring to the drawing, A designates generally an intermediate portion of a stopper type rock drill comprising a percussive cylinder B having a piston chamber C therein to accommodate a reciprocatory hammer piston D.

The hammer piston D may be of a well known type having a front extension E which may be slidably interlocked with chuck mechanism (not shown) at the front end of the cylinder B for rotating the working implement (not shown) which, as is customary, may extend into the chuck mechanism and be slidably interlocked therewith in such wise that the working implement may shift its position longitudinally of the chuck mechanism but is held against rotation with respect thereto.

In the construction shown the valve mechanism which is designated generally by F is shown disposed at the rear end of the cylinder B. It comprises a valve chest formed by a pair of plates G and H. The plate H is recessed to form therein a valve chamber J for the accommodation of an oscillatory plate valve K whereby the distribution of pressure fluid to the ends of the piston chamber is effected.

The plate G forms a closure for the rear end of the piston chamber C and has a rear inlet

passage L to convey pressure fluid from the valve chamber J into the rear end of the piston chamber C. The plate G is also provided with a front inlet passage O which extends through the cylinder B to the front end of the piston chamber for conveying pressure fluid thereto to drive the piston D rearwardly.

Seated upon the rear end of the plate H is a back head P having a bore Q extending through and the front portion R of the bore is somewhat enlarged for the accommodation of a ratchet ring S adapted to rotate within the portion R and for which the portion R serves as a bearing. The ratchet ring S is provided with the usual introverted teeth T to serve as abutments for spring pressed pawls U carried by the head V of a rifle bar W, said rifle bar W extending through the valve mechanism G and into the piston chamber C to engage the piston D in a well known manner.

A closure is provided for the rear end of the bore Q in the back head P by a head block X which in turn acts as a seat for a feeding cylinder Y, only a portion of which is shown.

The cylinder B, the plates G and H, the back head P, the head block X and the cylinder Y constitute the casing elements of the drill and may be clamped securely together in assembled relationship in any convenient manner, as for instance, by bolts (not shown).

Within the feeding cylinder Y is a feed piston Z having a rod b which may carry at its lower or outermost end a pointer (not shown) but which may be adapted to seat upon and engage a mine floor to support the drilling mechanism. The feeding cylinder Y and the piston Z may be of the usual construction in which the piston and the cylinder are freely rotatable with respect to each other.

The admission of pressure fluid into the drilling mechanism is controlled by a throttle valve c in the head block X and having a lever d whereby it may be manipulated. The throttle valve c is preferably of the rotary type and has a central chamber e into which pressure fluid from a source of supply may be constantly introduced. In the wall of the throttle valve c are a pair of ports f and g.

The port f is adapted to register with a supply passage h leading from the bore wherein the throttle valve c is arranged to the valve chamber J, and the port g is adapted to register with a passage j in the head block X and opening into the rear end of the cylinder Y to supply pressure fluid thereto for raising or actuating the

drilling mechanism with respect to the piston Z.

In order to maintain the casing parts of the drilling mechanism stationary, that is, to prevent their rotation when the pawls engage the ratchet ring S, the said mechanism is provided with a handle *k* secured to the cylinder B and has a grip portion *o* at its outer end which may be grasped by the operator to hold the casing of the drill against rotary movement.

In accordance with the practice of the invention means are provided for locking and releasing the ratchet ring S at will so that the ratchet ring S may act either as an abutment for the pawls U or may be permitted to rotate therewith in accordance with the conditions in the hole being drilled. To this end the ratchet ring S is provided on its rear surface with a series of clutch lugs or jaws *p* for engagement with cooperating lugs *q* arranged on the front end of a clutch member *r* slidable in the rear or reduced portion of the bore Q.

The clutch member *r* carries an introverted flange *s* having a polygonal aperture *t* to receive and engage a correspondingly shaped polygonal projection *u* carried by the head block X. The clutch member *r* is thus held against rotary movement but is capable of movement longitudinally of the drill.

On the rear end of the clutch member *r* is a cylindrical flange *v* which extends longitudinally of the clutch member and is slidable in an annular groove *w* in the head block X whereby it is guided. The flange *v* is of smaller diameter than the clutch member *r* thus forming a shoulder *x* rearwardly of the clutch lugs *q* to act as a seat for a spring *y* which encircles the flange *v* and seats with its rear end against a seating surface *z* on the head block X. The spring *y* acts to normally press the clutch member *r* into engagement with the clutch lug *p* of the ratchet ring for holding the said ratchet ring against rotary movement.

The front end of the clutch member *r* constitutes a pressure area 2 which is in constant communication with the valve chamber J through the interior of the ratchet ring S and a passage 3 in the plate H. Pressure fluid may therefore constantly flow from the valve chamber into the space between the clutch member *r* and the rear ends of the ratchet ring S and the head V of the rifle bar.

In order to provide an escape for the pressure fluid flowing to the pressure area 2 from the valve chamber J a passage 4 is formed in the plates H and G, the cylinder B and in the rotation handle *k*. The passage 4 communicates at one end with the interior of the ratchet ring S and opens at its other end into a bore 5 in the handle *k* and wherein is arranged a bushing 6 which is held securely in the bore 5 by a plug 7 threaded into the outer end of the handle *k*. The bushing 6 serves as a guide for a stem 8 carried by a valve 9 of the poppet type adapted to cooperate with a seat 10 in the bushing 6 to control the flow of pressure fluid from the passage 4 to the atmosphere.

The opening movement of the valve 9 is opposed by a spring 11 which acts at one end against the valve 9 and with its other end against a seat 12 disposed in the bottom of the bore 5 and having a port 13 therein to afford communication between the passage 4 and a chamber 14 in the bushing 6 and wherein the valve 9 is arranged.

The portion of the chamber 14 through which the stem 8 of the valve extends is of somewhat

larger diameter than said stem and communicates with an annular groove 15 in the periphery of the bushing 6 through ports 16 in the bushing. The groove 15 in turn communicates with the atmosphere through a passage 17 in the grip portion *o*.

In order that the valve 9 may be conveniently manipulated the stem 8 is provided at its outer end with a button 18 which may be secured to the stem 8 by means of a pin 19 and has a reduced portion 20 which is guided by the plug 7. The button 18 is conveniently located with respect to the grip portion *o* so that it may be reached by a finger of the hand whereby the grip portion *o* is grasped.

The operation of the device is as follows: With the throttle valve *c* in the open position, pressure fluid flows to the valve chamber J where it will be distributed by the valve to the ends of the piston chamber C. Pressure fluid will then also flow into the feeding cylinder Y to act against the piston Z for raising the drilling mechanism to the work in accordance with the penetration of the working implement thereto.

During such operation of the drill the valve 9 may be maintained open. The pressure fluid thus flowing from the valve chamber J through the passage 3 and the ratchet ring S may then readily escape to the atmosphere through the passage 4 and associated passages and ports leading through the grip portion *o* to the atmosphere.

In the absence of pressure fluid acting against the pressure area 2 the spring *y* will press the clutch member *r* into engagement with the ratchet ring S. The ratchet ring S will therefore be held against rotary movement and will act as a stationary abutment for the pawls U. In consequence of this arrangement the piston will describe a partial revolution on the rifle bar W during each complete cycle of movement. Being interlocked with the working implement through the chuck mechanism the piston will then also shift the working implement to a new position between successive blows of the hammer piston D.

Whenever the working implement becomes stuck in the drill hole, and in which event a thrust of such severity is usually imparted to the casing elements of the drill by the rotation mechanism that the grip portion *o* is jarred out of the operator's hand, the spring 11 will then immediately close the valve 9. The pressure fluid thereafter flowing from the valve chamber J through the passage 3 and the ratchet ring S will be entrapped in the space between the ratchet ring and the pressure area 2 and will move the clutch member *r* out of engagement from the clutch lugs *p* of the ratchet ring S.

The ratchet ring S may then rotate freely with the rifle bar during the subsequent reciprocations of the piston D. In this way the rotation mechanism will be disconnected from the casing parts which, together with the handle *k*, will remain stationary instead of rotating rapidly about the axis of the drilling mechanism as heretofore.

I claim:

In a safety device, the combination with a rock drill having a hammer piston and rotation mechanism comprising a rifle bar wherewith the piston is slidably interlocked, a pawl carried by the rifle bar, a rotatable ratchet ring to act as an abutment for the pawl, a clutch member interlocked with the drill and being reciprocable therein, a pressure area on the clutch member

and being in communication with a source of pressure fluid supply, means for pressing the clutch member into interlocking engagement with the ratchet ring, an atmospheric vent for the pressure area, a valve for controlling the vent and being adapted to be held open by the operator to communicate the pressure area with the atmosphere during the normal operation of the drill, and a spring to close the valve upon release thereof by the operator, thereby entrapping pressure fluid in the vent to actuate the clutch member out of engagement from the ratchet ring and permitting the ratchet ring to rotate with the rifle bar.

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