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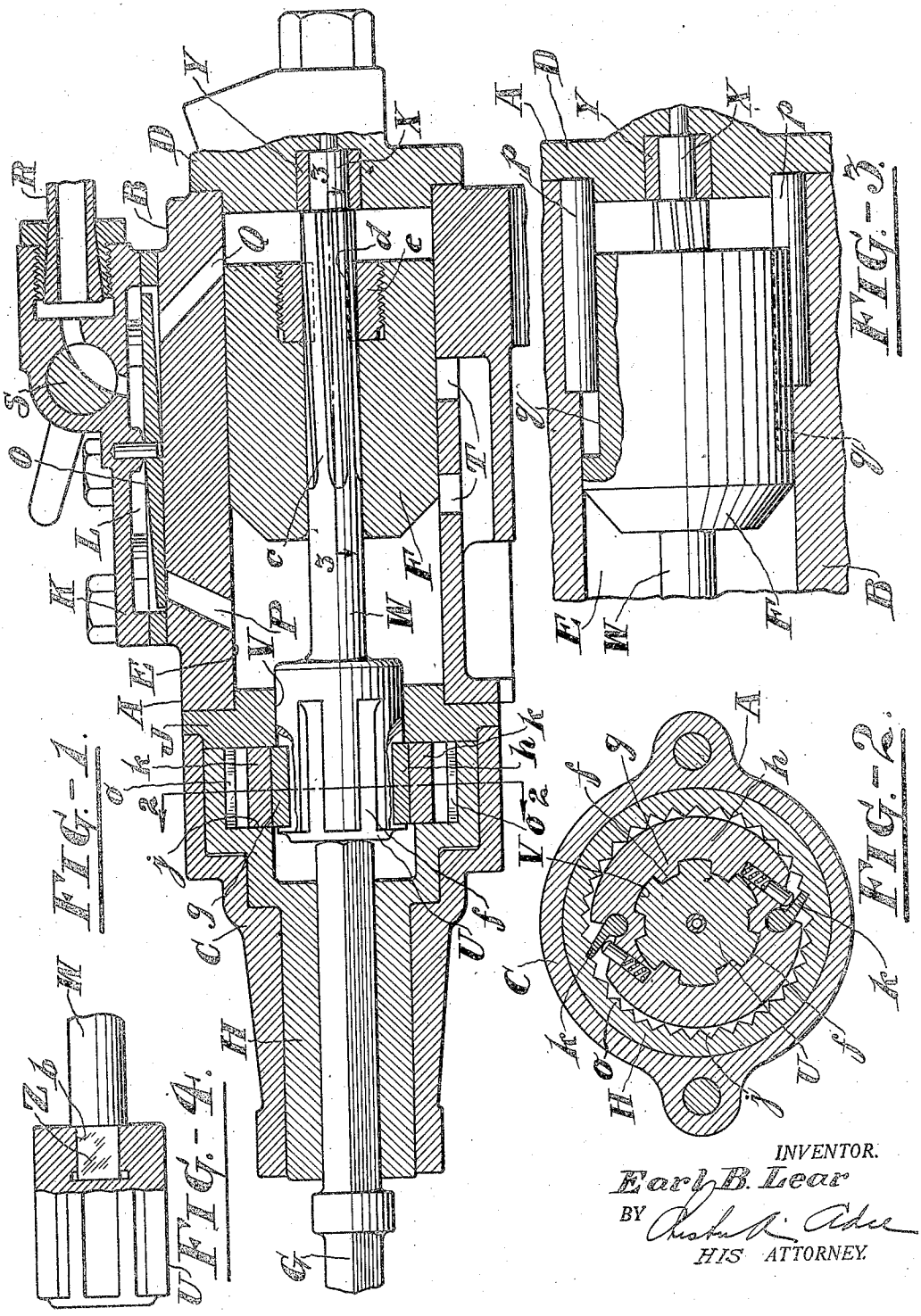


FIG. - 1.

FIG. - 4.

FIG. - 2.

FIG. - 3.

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ROTATION MECHANISM FOR ROCK DRILLS

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This invention relates to rock drills, but more particularly to a rotation mechanism for fluid actuated rock drills of the hammer type.

One object of the invention is to effect a step by step rotary movement of the working implement in order to change the position of the working implement prior to each blow of the hammer piston.

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

In the drawings illustrating the invention and a practical application thereof,

Figure 1 is a longitudinal sectional elevation of a rock drill equipped with rotation mechanism constructed in accordance with the practice of the invention,

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

Figure 3 is a plan view of a detail taken through Figure 1 on the line 3—3 looking in the direction indicated by the arrows, and

Figure 4 is a longitudinal view partly in section showing a modified form of a detail of the invention.

Referring to the drawings the invention is shown applied to a rock drill designated generally by A and comprising a cylinder B and front and back heads C and D respectively. The cylinder B is bored to form a piston chamber E for the accommodation of a reciprocatory hammer piston F adapted to actuate a working element G which extends into a chuck H disposed rotatably within the front head C.

A closure is provided for the front end of the piston chamber E by a front cylinder washer J which also serves to centralize the cylinder and the front head with respect to each other. In the construction shown the back head D is seated directly on the rearward end of the cylinder and forms a closure for the same end of the piston chamber E.

The distribution of pressure fluid to the ends of the piston chamber for actuating the piston F may be effected by any suitable and convenient manner. The means illustrated for this purpose comprises a valve chest K having a valve chamber L in which is disposed an oscillatory plate valve O adapted to control inlet passages P and Q leading from the front and rearward ends respectively of the valve chamber L to the corresponding ends of the piston chamber.

Pressure fluid for operating the drill may be conveyed from a suitable source of supply (not shown) through a connection R and the flow of pressure fluid from the connection R to the valve chamber L may be controlled by a suitable throttle valve S. The exhaust of fluid from the piston chamber E is effected through exhaust ports T in the cylinder and said exhaust ports are controlled by the piston F.

In accordance with the practice of the invention means are provided for effecting a step by step rotary movement of the working implement G in order to change its position with respect to the work for each blow of the hammer piston F. The means provided for this purpose comprises an anvil block U which is slidably guided by a bore V in the front cylinder washer J and carries a bar W which extends entirely through the piston chamber E and therefore also through the hammer piston F. The rearward end of the bar W may have a reduced portion X to extend slidably into the back head D, or, as illustrated, into a bushing Y seated in the back head to form a bearing for the portion X.

The bar W may, if desired, form an integral part of the anvil block U as indicated in Figure 1 or may be formed separately as illustrated in Figure 4 and be suitably interlocked with the anvil block U. In the latter case the bar W may be provided with a polygonal end Z to extend into a correspondingly shaped bore *b* in the anvil block U.

In order to translate the reciprocatory movement of the hammer piston F into a rotary movement of the anvil block U the bar W is provided with spiralled ribs *c* which engage similar ribs *d* of a spirally fluted nut *e* threaded into the rearward end of the piston F. The portion of the hammer piston F forwardly of the nut *e* is preferably in slidable engagement with the bar W to prevent the passage of pressure fluid from one end of

the piston chamber E to the other through the piston.

Means are provided for transmitting the rotary movement of the anvil block U to the chuck H. The anvil block U is accordingly provided with a series of longitudinal flutes *f* to accommodate introverted ribs *g* of a head *h* which encircles the anvil block U. The ribs *g* may be of such proportions that the anvil block U may reciprocate freely relatively to the head *h*.

The head *h* lies in a cavity *j* in the rearward end of the chuck H and bears with one end against the chuck and with its other end against the surface of the front cylinder washer J. Spring pressed pawls *k* are carried by the head *h* to engage ratchet teeth *o* in the chuck H for holding the head against rotary movement during the rearward stroke of the hammer piston F.

In order to prevent rotary movement of the hammer piston F relatively to the cylinder B said cylinder is provided with a key or keys *p* which engage key-ways *q* in the hammer piston F. The keys *p* and the key-ways *q* are of such lengths that the piston will remain in engagement with the keys throughout the entire stroke of the piston.

The operation of the device is as follows: With the parts in the positions illustrated in Figure 1 and upon the admission of pressure fluid into the rearward end of the piston chamber E the piston F will be driven forwardly to deliver its blow against the anvil block U. The blow of the piston will thus be transmitted by the anvil block to the working implement G. During this movement of the piston F the anvil block U will of course be rotated a partial revolution due to its spiral engagement with the piston and to the fact that the piston is incapable of rotary movement. However, the rotary movement of the anvil block U will not be then transmitted to the chuck H since the movement of the head *h* will be in a direction in which the pawls *k* will merely pass over the ends of the ratchet teeth *o*.

After the piston has delivered its blow against the anvil block and moves in a rearwardly direction it will again rotate the anvil block and during this movement of the anvil block the pawls *k* will engage the ratchet teeth *o* and thus transmit the rotary movement of the anvil block U to the chuck H and consequently also to the working implement G. From this point the cycle of operations may be repeated.

I claim:

1. In rotation mechanism for rock drills, the combination of a cylinder and a rotatable chuck, a working implement in the chuck, a hammer piston in the cylinder to actuate the working implement, means for preventing rotation of the piston in the cylinder, means for transmitting the blows of the hammer piston to the working implement, a bar associated with said means and having spiral ribs interlockingly engaging the hammer piston to effect rotation of said means during the reciprocations of the hammer piston, and means for transmitting the rotary movement of the first said means to the chuck.

2. In rotation mechanism for rock drills, the combination of a cylinder and a rotatable chuck, a working implement in the chuck, a hammer piston in the cylinder to actuate the working implement, means for preventing rotation of the piston in the cylinder, means for transmitting the blows of the hammer piston to the working implement, a bar associated with said means and having spiral ribs interlockingly engaging the hammer piston to effect rotation of said means during the reciprocations of the hammer piston, and means associated with the said means for transmitting the rotary movement of the first said means to the chuck during the stroke of the piston in one direction.

3. In rotation mechanism for rock drills, the combination of a cylinder and a rotatable chuck, a working implement in the chuck, a hammer piston in the cylinder to actuate the working implement, means for preventing rotation of the piston in the cylinder, means for transmitting the blows of the hammer piston to the working implement, a bar associated with said means and having spiral ribs interlockingly engaging the hammer piston to effect rotation of said means during the reciprocation of the hammer piston, and means associated with the said means for transmitting the rotary movement of the first said means during the rearward stroke of the piston.

4. In rotation mechanism for rock drills, the combination of a cylinder and a rotatable chuck, a working implement in the chuck, a reciprocatory hammer piston in the cylinder to actuate the working implement, means for preventing rotation of the piston in the cylinder, an anvil block for transmitting the blows of the hammer piston to the working implement, a bar carried by the anvil block and having spiral ribs to interlockingly engage the piston for effecting rotation of the anvil block, a head in fluted engagement with the anvil block, ratchet teeth carried by the chuck, and spring-pressed pawls in the head adapted to cooperate with the ratchet teeth to effect a step by step rotary movement of the chuck during the reciprocation of the piston.

5. In rotation mechanism for rock drills, the combination of a cylinder and a rotatable chuck, a working implement in the chuck, a reciprocatory hammer piston in the cylinder to actuate the working implement, means for preventing rotation of the piston in the cylinder, an anvil block to transmit the blows of the hammer piston to the working implement, a bar carried by the anvil block, a

closure for the cylinder acting as a bearing for the free end of the bar, spiralled ribs on the bar interlockingly engaging the piston to effect rotation of the anvil block during the stroke of the piston in one direction, a head encircling the anvil block and in fluted engagement therewith, ratchet teeth carried by the chuck, and spring-pressed pawls in the head engaging the ratchet teeth to transmit the rotary movement of the anvil block to the chuck.

6. In rotation mechanism for rock drills, the combination of a cylinder and a rotatable chuck, closures for the ends of the cylinder, an anvil block slidably guided by one closure and having a bar extending slidably into another closure, a hammer piston in the cylinder for delivering blows of impact against the anvil block, spiralled ribs on the bar interlockingly engaging the piston to effect a rotary movement of the anvil block during the stroke of the piston in one direction, means for holding the piston against rotation in the cylinder, a head encircling the anvil block and in fluted engagement therewith, ratchet teeth carried by the chuck, and spring-pressed pawls in the head engaging the ratchet teeth to transmit the rotary movement of the anvil block to the chuck.

In testimony whereof I have signed this specification.

EARL B. LEAR.