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T. L. MURPHY

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VALVE CHEST FOR ROCK DRILLS

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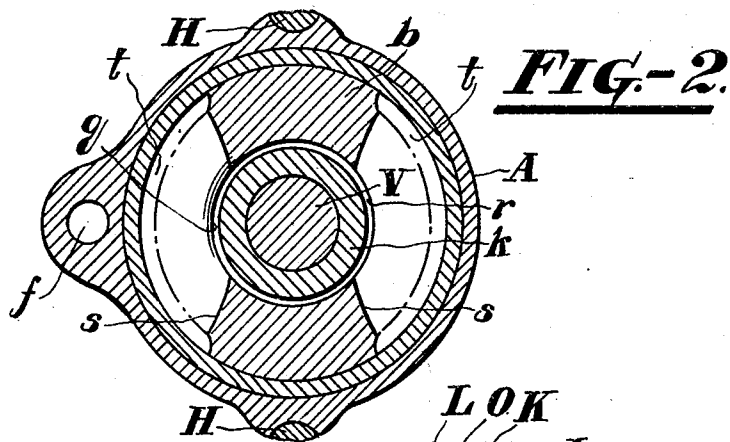


FIG.-2.

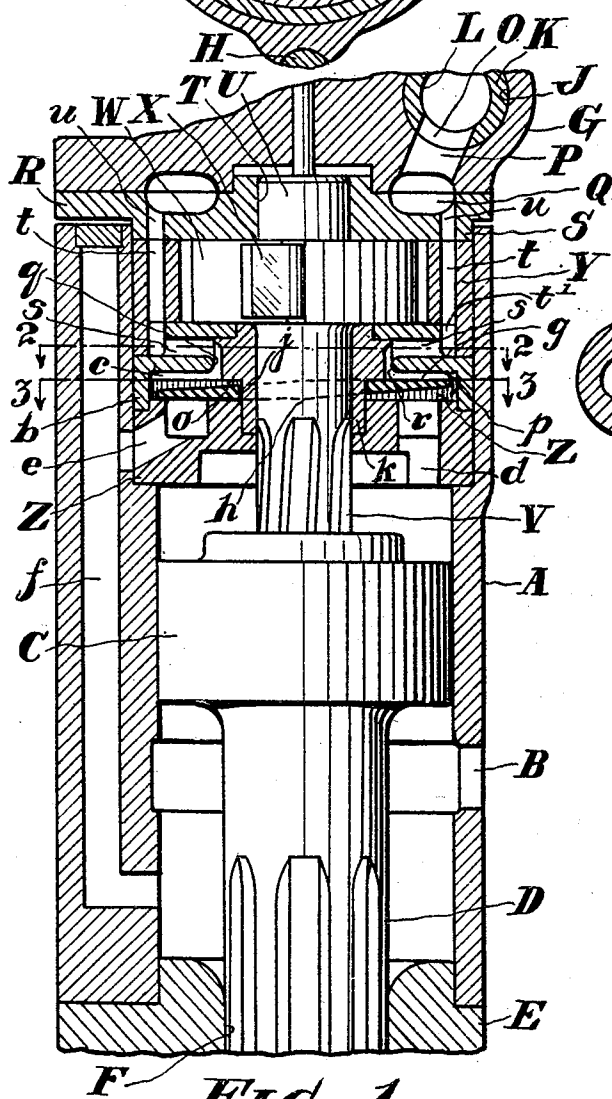


FIG.-1.

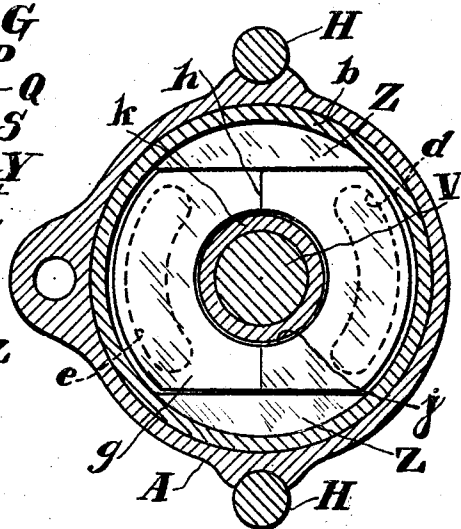


FIG.-3.

INVENTOR.
Thomas L. Murphy
 BY *Charles B. Adair*
 HIS ATTORNEY

UNITED STATES PATENT OFFICE

THOMAS L. MURPHY, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY

VALVE CHEST FOR ROCK DRILLS

Application filed May 17, 1928. Serial No. 278,370.

This invention relates to rock drills, but more particularly to a valve chest for fluid actuated rock drills of the type employing an oscillatory plate valve for distributing the pressure fluid to the cylinder.

One object of the invention is to increase the efficiency of drills employing valves of this type by preventing eddying of the pressure fluid in the valve chamber during the passage of such pressure fluid into the cylinder.

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

In the drawings accompanying the specification and in which similar reference characters refer to similar parts,

Figure 1 is a sectional elevation of so much of a rock drill as will serve to illustrate the invention, and

Figures 2 and 3 are transverse views taken on the lines 2—2 and 3—3 looking in the direction indicated by the arrows.

Referring more particularly to the drawings, A designates a cylinder having a free exhaust port B. A piston C disposed in the cylinder A controls the free exhaust port B and has a reduced forward extension D adapted to strike against a working implement (not shown). The front end of the cylinder A is sealed by a head E having a bore F to slidably receive the extension D.

At the rearward end of the cylinder A is a back head G which may be connected to the cylinder by means of side rods H. The back head G is provided with a bore J in which is disposed a throttle valve K for controlling the admission of pressure fluid into the drill. The throttle valve K has a bore L into which pressure fluid from a suitable source of supply (not shown) may be admitted, and in one side of the throttle valve K is a port O which in the open position of the throttle valve registers with a passage P leading to a supply chamber Q formed in the contiguous surfaces of the back head G and a plate R interposed between the back head G and the cylinder A.

Preferably the plate R is provided at its forward end with a projection S which extends into the rearward end of the cylinder

for the purpose of centralizing said plate with respect to the cylinder. The plate R has a bore T which forms a bearing for a trunnion U of a rifle bar V interlocked slidably with the piston in the usual manner for imparting rotary movement to the working implement. The rifle bar V may be of a well known type having a head W in which are disposed spring pressed pawls X adapted to cooperate with a toothed rotation ratchet Y for causing rotation of the piston during the forward stroke of the piston.

In accordance with the present invention, a valve chest comprising a pair of plates Z and b are disposed in the rearward end of the cylinder A to form a valve chamber c. The plate Z forms a closure for the rearward end of the cylinder and is provided with a pair of inlet passages d and e for conveying pressure fluid from the valve chamber c to the rearward and forward ends respectively of the cylinder. A passage f in the cylinder in this instance forms a continuation of the passage e to the front end of the cylinder. The plate b serves as a seat for the head W and the rotation ratchet Y and the valve chamber c may be formed as shown by recessing the forward end of the plate b. In the valve chamber c is disposed a distributing valve g of the oscillatory plate type having a fulcrum h on its transverse median line on which the valve g is pivoted.

In the present instance the valve g is provided with a central aperture j to receive a hollow plug k disposed about the rifle bar to prevent leakage of pressure fluid from the valve chamber along the rifle bar into the rearward end of the cylinder A. The plug k has a lateral shoulder o which acts as a valve stop and said shoulder o preferably lies somewhat below the uppermost surface p of the valve chamber so that pressure fluid may flow freely over the raised ends of the valve into the inlet passages.

In the plate b is formed an aperture q through which the plug k extends. The aperture q is of sufficiently larger diameter than the plug k to form an annular supply passage r through which pressure fluid is admitted into the valve chamber c. The an-

nular supply passage *r* communicates with the supply chamber *Q* through the transverse passages *s*, formed in the plate *b* and passages *t* and *u* formed in the rotation ratchet *Y* and the plate *R* respectively and lying radially outside of the rifle bar.

In the preferred form of the invention the plate *b* is formed with a rearward reduced extension adapted to seat in a circular recess formed in the adjacent end of the rotation ratchet *Y*. Peripheral grooves in the reduced extension cooperate with the walls of the recess to form passages *t'* which are continuations of the passages *t*. The passages *s* extend to the periphery of the reduced portion and communicate with the passages *t'* adjacent the forward extremities thereof.

The course of the pressure fluid during the operation of the drill is as follows: After the throttle valve *K* is opened to the position illustrated in Figure 1, pressure fluid admitted into the supply chamber *Q* will flow through the passages *u*, *t* and *s* and through the annular passage *r* into the intermediate or innermost portion of the valve chamber *c*. Upon entering the valve chamber *c*, the pressure fluid will flow in an outwardly direction over the raised ends of the valve *g* into the cylinder. The valve chamber itself will therefore serve as a passage for the pressure fluid during the course of the pressure fluid to either inlet passage and the tendency of the pressure fluid to eddy in the valve chamber will be obviated. This is desirable since it tends to quicken the action of the valve.

Heretofore in drills employing valves of the type illustrated, it has been customary to admit the pressure fluid into the valve chamber over the end or near the end of the valve. The admission of the pressure into the valve chamber in this manner, however, causes the pressure fluid to eddy in the intermediate portion of the valve chamber and to retard the action of the valve. Due to the present invention this sluggish action of the valve has been entirely overcome and the efficiency of the drill is therefore considerably increased.

I claim:

1. In a fluid actuated rock drill, the combination of a cylinder and a piston, a valve chest in the cylinder comprising a pair of plates disposed in face to face relationship and forming a closure for one end of the cylinder, rotation mechanism for the piston including a ratchet ring seated on said valve chest and a rifle bar engaging the ratchet ring and extending through the valve chest to interlockingly engage the piston, a centrally disposed recess in the face of one of the plates to form a valve chamber, a sealing plug disposed about the rifle bar and cooperating with the plates to prevent leakage of pressure fluid from the valve chamber along the rifle bar, inlet passages leading from the

valve chamber to the cylinder, an oscillatory plate valve in the valve chamber controlling the inlet passages, said valve having a central bore to receive the sealing plug, a central axial bore in the rearmost plate to form an annular supply passage in the valve chest encircling the sealing plug, longitudinally disposed passages in the ratchet ring and the rearmost plate, the last said passages communicating with a source of pressure fluid supply, transversely extending passages in the rearmost plate connecting the last mentioned passages with the annular supply passage, and a shoulder on the sealing plug located below the upper wall of the valve chamber to form a stop for the valve.

2. In a fluid actuated rock drill, the combination of a cylinder and a piston, a valve chest in the cylinder comprising a pair of plates disposed in face to face relationship and forming a closure for the rearward end of the cylinder, a reduced extension on the rearmost plate, a ratchet ring adapted to seat on the rearmost plate and having a recess in one end to receive the extension on said plate, a rifle bar engaging the ratchet ring and extending through both plates to interlockingly engage the piston, a centrally disposed recess in the face of one of the plates to form a valve chamber, a sealing plug disposed about the rifle bar and cooperating with the plates to prevent leakage of pressure fluid from the valve chamber along the rifle bar, inlet passages leading from the valve chamber to the ends of the cylinder, an oscillatory plate valve in the valve chamber controlling the inlet passages, said valve having a central bore to receive the sealing plug, a central axial bore in the rearmost plate to form an annular supply passage encircling the sealing plug, longitudinally disposed passages in the ratchet ring communicating with a source of pressure fluid supply, peripheral grooves in the extension forming continuations of the last said passages, transverse passages in the extension connecting said grooves with the annular supply passage, and a shoulder on the sealing plug located below the upper wall of the valve chamber to form a stop for the valve.

In testimony whereof I have signed this specification.

THOMAS L. MURPHY.