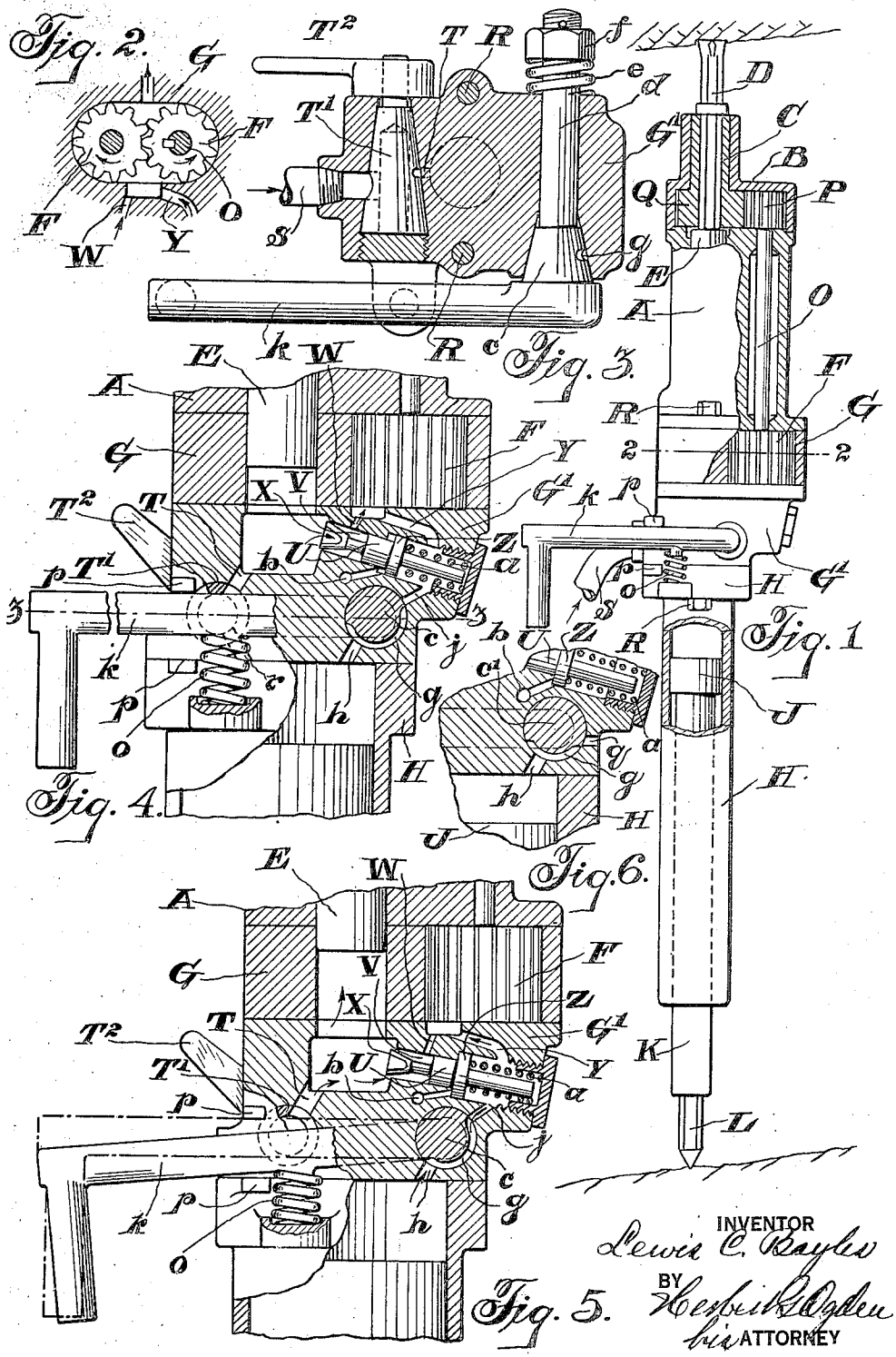
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AIR FEED CONTROL FOR ROCK DRILLS.

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UNITED STATES PATENT OFFICE.

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AIR-FEED CONTROL FOR ROCK DRILLS.

Application filed September 4, 1920. Serial No. 408,299.

To all whom it may concern:

Be it known that I, LEWIS C. BAYLES, a citizen of the United States, and a resident of Easton, Northampton County, State of Pennsylvania, have invented certain new and useful Improvements in Air-Feed Controls for Rock Drills, of which the following is a specification.

This invention relates to fluid pressure rock drills of the hammer type, but more particularly to air feed control for the feeding element of a stope drill.

In operating a stope drill, in case a soft spot is encountered for instance, the operator ordinarily wishes to reduce the power of the air feed, but requires full rotation and hammer power, or if possible, increased rotation to enable the machine to operate in the most efficient manner. The operator should also be able to quickly reduce the power of the air feed, because delay may mean that the drill will stick. With the usual air feed controlling devices provided on stope drills, the operator must hold the handle provided on the machine with one hand and adjust a throttle or other controlling device with the other hand, and he may not do this quickly enough to avoid trouble. Furthermore, no means have heretofore been provided with increasing the rotation under such circumstances.

The primary objects of the present invention are to enable the operator, not only to quickly reduce the power of the air feed with full rotation and hammer power, but at the same time actually increase the rotation as long as needed, and he may effect this regulation and control without changing his grip on the machine.

Another object of the invention is to effect the control described by bearing down or pressing rearwardly on the handle of the machine with a given pressure sufficient to overcome the resistance of a spring or other device which normally maintains the handle and operatively connected controlling valve in the off or inoperative position. Such pressure on the handle will open the said controlling valve and reduce the power of the air feed, and increase the rotation by delivering the exhaust from the air feed into the rotation motor, thus augmenting the pressure in the motor when most needed. Other means could be devised for thus increasing the rotation without departing from the spirit of the invention, and I am to be understood as disclosing only one operative means for illustrative purposes.

To these ends the invention is illustrated in some of its preferred forms in the accompanying drawings, in which

Figure 1 is a side elevation partly in vertical section of a rock drill having the invention embodied therein,

Figure 2 is a detail transverse sectional view taken through the rotation motor on the line 2—2 of Figure 1,

Figure 3 is an enlarged detail horizontal sectional view on the line 3—3 of Figure 4,

Figure 4 is an enlarged detail vertical sectional view partly broken away through the head block and immediately connected operative parts of the machine.

Figure 5 is a view similar to Figure 4 with the handle and controlling valve in a different position, and

Figure 6 is a detail horizontal sectional view showing a modification in the construction of the controlling valve.

Referring to the drawings, a stope drill is illustrated in the figures having the cylinder A and front head B provided with the rotation sleeve C through which the drill steel D extends in position to receive the impact blows of the hammer E. An independent fluid actuated rotation motor is provided for rotating the drill steel, and in this instance a gear motor is indicated having the gears F, only one of which is shown in Figure 1, in the motor casing formed by the back end portion G of the cylinder. A head block G′ is shown located between the cylinder portion G and the fluid pressure feed cylinder H having the piston J and piston rod K provided with the rock engaging point L. One of the gears F of the motor is operatively connected through a suitable shaft O and pinion P, meshing with the gear Q on the rotation sleeve C, for rotating the drill steel. The cylinder A, back end portion or motor casing G, head block G′ and feed cylinder H are suitably held together as by means of the through bolts R.

Fluid pressure, as live air, is supplied to the machine at the inlet S and passes through the admission port T controlled by the throt-

tle valve T' having the handle T^2 to the percussive element and also through the small port *r* to the feed cylinder. Fluid also passes to the rotation motor through the valve chamber V and admission port W controlled in this instance by the automatic regulating valve U which forms the subject matter of a separate application for patent, Serial No. 361,758, filed February 27, 1920, by Fred M. Slater and myself. This valve U need not be further described, than to say that it is provided with a tapered head X which graduates the admission of fluid pressure to the motor and an increased back pressure from the motor through the port Y on the plunger head Z assisted by the light spring *a*, tends to open the valve wider and admit more pressure to the motor as needed. A corresponding reduction of pressure on the plunger head Z permits the tapered head X of the valve to move inward against the light spring pressure and reduce the supply of the motor as required. A bleeder port *b* is preferably provided beneath the plunger Z.

A controlling valve *c* having a stem *d* is mounted in the head block G' and held to its seat in any suitable manner as by means of the spring *e* and nut *f*. As shown in detail in Figures 4 and 5, this controlling valve is provided with a port *g* adapted to place the exhaust port *h* from the feed cylinder in communication with the supplementary admission port *j* leading to the rotation motor through the valve chest of the valve Z and through the fluid passage Y. When the valve *c* is in the position indicated in Figure 4, this communication is cut off, but is established in the position of the valve shown in Figure 5, with the result that the power of the air feed is reduced and at the same time, the rotation is increased by the augmentation of the pressure supplied to drive the motor. If, however, the motor has stopped, the air feed will be exhausted to atmosphere through the motor. At the normal working conditions the pressure on the intake side of the rotation motor is only about one-quarter of that in the air feed.

Any suitable means may be provided for operating the controlling valve *c*, but I prefer to actuate the valve by means of the handle *k* of the machine, commonly called the rotation handle, which is grasped and usually held by the operator while the machine is running. This handle forms a ready and convenient means for manually actuating the controlling valve. I have found that by pivotally mounting the handle in such manner that it has a generally forward and rearward movement which becomes an up and down movement if the machine is vertical, the valve may be manipulated quickly, because the instinctive tendency of an operator is to press or pull down on the handle if the drill sticks and reduced feed power and increased rotation are desired.

In carrying out this construction, the handle *k* may be formed in one piece with the valve *c* as shown or they may be otherwise operatively connected. A compression spring *o* or other retracting device may be provided beneath the handle *k* to return it to normal position with the valve *c* closed and suitable stops *p* limit the pivotal movement of the handle. In the operation of the device, the handle is depressed by pressure of the hand sufficient to overcome the resistance of the spring *o*, and the air feed is exhausted into the rotation motor, which reduces the feed power and increases the rotation.

In the modification shown in Figure 6, the supply from the air feed to the rotation motor is omitted and the air feed is exhausted directly to atmosphere through the port *q* by the valve *c'*. This modified form of controlling valve may be preferable in some instance, and either form may be used as desired.

I claim:

1. A rock drill of the hammer type, having a fluid actuated rotation motor and a fluid pressure feeding element, and controlling means for reducing the power of the fluid pressure feed, including means for simultaneously increasing the rotation by exhausting the feeding means into the rotation motor.

2. A rock drill of the hammer type, having a fluid actuated rotation motor and a fluid pressure feeding element, and controlling means for simultaneously reducing the power of the fluid pressure feed and increasing the rotation, by connecting the exhaust from the feeding element to the intake of the rotation motor.

3. A rock drill of the hammer type, having a fluid actuated rotation motor and a fluid pressure feeding element, a pivoted handle for the machine adapted to be grasped by the hand of the operator, a valve operatively connected with said handle and controlling ports and passages between the feeding element and the rotation motor, for simultaneosuly reducing the feed power and increasing the rotation.

4. A rock drill of the hammer type, having a fluid actuated rotation motor and a fluid pressure feeding element, a handle pivoted for forward and rearward movement and adapted to be grasped by the hand of the operator, a valve operatively connected to said handle and controlling ports and passages for delivering the exhaust from the feeding element to the intake of the rotation motor, thereby reducing the feed power while increasing the rotation.

5. A rock drill of the hammer type, hav-

ing a fluid actuated rotation motor and a fluid pressure feeding element, a handle pivoted for forward and rearward movement and adapted to be grasped by the hand of the operator, yielding means forcing the handle to forward position, means controlled by said handle for reducing the feed power by rearward movement of the handle, and stops for limiting the forward and rearward movement of the handle.

In testimony whereof I have signed this specification.

LEWIS CONDICT BAYLES.