April 26, 1932. W. P. VAN EPS 1,855,266

FEEDING DEVICE

Filed March 26, 1930

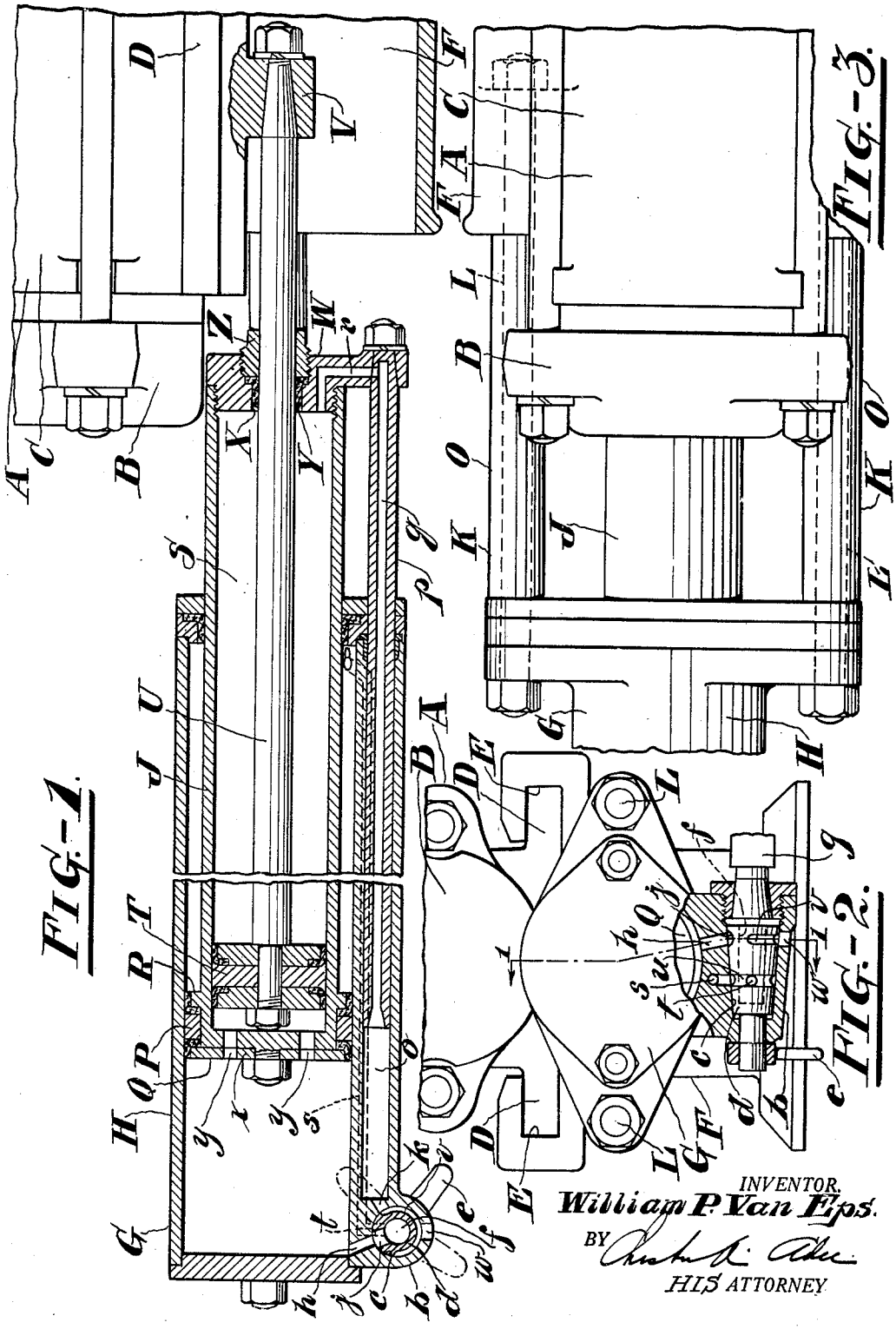


FIG.-1.

FIG.-2.

FIG.-3.

INVENTOR.
William P. Van Eps.
BY
HIS ATTORNEY

Patented Apr. 26, 1932 1,855,266

UNITED STATES PATENT OFFICE

WILLIAM P. VAN EPS, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY

FEEDING DEVICE

Application filed March 26, 1930. Serial No. 438,992.

This invention relates to rock drills, but more particularly to a feeding device for fluid actuated rock drills of the drifter type.

The objects of the invention are to maintain a suitable pressure on the drilling apparatus for feeding it towards the work in accordance with the penetration of the drill steel into the material being drilled and to facilitate the operation of withdrawing the drilling apparatus from the work.

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

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

Figure 1 is a longitudinal sectional view of the feeding device showing it applied to a drifter and its support,

Figure 2 is an end view of the feeding device partly broken away, and

Figure 3 is a top plan view illustrating the manner in which the feeding device is supported.

Referring to the drawings, A designates generally a rock drill of which only the back head B and a portion of the cylinder C are shown to illustrate the application of the invention. The rock drill illustrated may be of the drifter type in which the cylinder C is provided with the usual ribs D extending longitudinally thereof on opposite sides and which ribs are adapted to slide in guideways E of a support for the drill, such as a shell F. The shell F may be of any well known type adapted to be clamped to a column or bar (not shown) to form a guide for the rock drill A.

In accordance with the present invention, means are provided for actuating the rock drill A longitudinally of the shell F both in the direction of the work and to retract the drill A from the work. The means provided for this purpose consists of a feeding device designated generally by G and comprising outer and inner tubular members H and J respectively which are telescopically arranged with respect to each other so that the inner member J is capable of movement in a longitudinal direction in the outer member H.

The outer member, in this instance, is suitably supported by standards K in the form of bolts L which are secured to the rear end of the shell F at one end and with the other end to the adjacent portion of the outer member H. The bolts L may be provided with suitable sleeves O to abut the adjacent ends of the outer member H and the shell F for holding these elements in suitably spaced relation with respect to each other.

The inner member J is provided with a piston head P having an end pressure surface Q against which pressure fluid in the rear end of the outer member H acts for actuating the inner member J forwardly in the direction of the shell F. On the front end of the head P is a pressure surface R of smaller area than the pressure surface Q and against which pressure fluid in the front end of the outer member H acts for actuating the inner member J rearwardly.

The interior of the inner member J is in the form of a piston chamber S to accommodate a piston T which is adapted to reciprocate within the piston chamber S and is connected to the rear end of a piston rod U, the opposite or front end of the rod being connected to a lug V which may be located on the cylinder C.

The front end of the inner member J through which the piston rod U reciprocates is provided with a suitable closure in the form of a head W having a bore X therein for the accommodation of the rod U. Preferably suitable sealing material, such as a cup leather Y, is disposed in the bore X to form a seal around the rod U, and a gland Z may be threaded into the bore X to secure the cup leather Y in position.

Located on the outer member H is a valve chest *b* having a valve chamber *c* wherein is disposed a throttle valve *d* of the rotary type having a suitable lever *e* whereby said throttle valve may be manipulated. Within the throttle vale *d* is a recess *f* which is constantly supplied with pressure fluid conveyed thereto by a coupling or connection *g* which is attached to the valve chest *b*.

Leading from the valve chamber *c* to the rear end of the outer member H is a supply

passage *h* through which pressure fluid may be introduced into the member H for actuating the member J forwardly in the direction of the shell F. In the throttle valve *d* is a port *j* which is adapted to register with the passage *h* and also with a passage *k* leading to a bore *o* which extends longitudinally of the outer member H and on one side thereof. The bore *o* serves both as a pressure fluid supply passage *q* and also as a guide for a tube *p* which is adapted to slide within the bore *o* and is secured with its front end to the head W. The passage *q* in the tube *p* registers at its front end with a passage *r* in the head W for introducing pressure fluid into the front end of the inner member J.

Pressure fluid intended to act against the pressure surface R for actuating the inner member J rearwardly is conveyed to the front end of the outer member by a supply passage *s* which extends from the valve chamber *c* through the outer member H and opens into the front end of the said outer member. In order to insure constant pressure within the front end of the outer member H the throttle valve *d* is provided with a port *t* which opens into a groove *u* in the periphery of the throttle valve *d* and which may be of such extent that it will be in registry with the supply passage *s* in the various positions which the throttle valve *d* may assume in practice.

In the periphery of the throttle valve *d* and in the same transverse plane as the port *j* is a partly annular groove *v* which is adapted to establish communication between the passages *k* and *h* and an exhaust port *w* in the valve chest *b* and leading to the atmosphere.

In the rear end or wall *x* of the inner member J are formed passages *y* for admitting pressure fluid into the rear end of the piston chamber S directly from the rear end of the member H.

The operation of the device is as follows: Let it be assumed that it is intended to actuate the rock drill A in a forwardly direction. If then the throttle valve *d* be rotated to the position illustrated in Figure 1, pressure fluid will flow through the port *j* and the passage *h* into the rear end of the outer member H. Such pressure fluid will then act against the pressure surface Q to move the inner member J forwardly. At the same time pressure fluid will flow through the passages *y* into the rear end of the piston chamber S and will act against the piston T.

As the drilling apparatus proceeds forwardly the inner member J and the piston T will be moved in that direction in unison until the head P reaches the front end of the outer member H. From then on only the pressure fluid acting against the piston T will be effective to drive the drilling apparatus forwardly.

During this forward movement of the drilling apparatus, pressure fluid will, of course, also be present in the front end of the outer member H. Inasmuch however, that the rear pressure surface Q is of greater area than the pressure surface R of the head P the pressure fluid in the front end of the outer member H will merely exert a slight cushioning effect. This is desirable, particularly when drilling down holes or holes inclining from the horizontal since, in this mode of drilling, the movement of the drilling apparatus is assisted to a considerable extent by gravity. The relative areas of the pressure surfaces Q and R are such, however, that a suitable pressure for feeding the drilling apparatus forwardly will at all times be assured.

After the drill steel has penetrated the work to the desired extent or, in other words, when the drilling apparatus has reached the foremost limit of its travel in the shell F, the throttle valve *d* may be rotated to carry the port *j* into registry with the passage *k*. In this position of the throttle valve *d* the groove *v* will establish communication between the passage *h* and the exhaust port *w* so that the pressure fluid in the rear ends of the outer member H and the piston chamber S will be exhausted to the atmosphere. The pressure fluid then admitted into the front end of the piston chamber S and that acting against the pressure surface R will act to retract the inner member J and the piston T, and therefore the rock drill A relatively to the shell F.

When the drilling apparatus has been retracted in the manner described the throttle valve *d* may be rotated to a position in which the groove *v* will establish communication between the passage *k* and the exhaust port *w*. The pressure fluid may then be exhausted from the front end of the piston chamber S or may be retained therein as in the front end of the outer member H to hold the rock drill A in the retracted position during the operation of changing drill steels.

I claim:

1. In a feeding device, the combination of a support and a motor slidable on the support, a feeding cylinder comprising inner and outer tubular members arranged telescopically with respect to each other, means for securing the outer member fixedly to the support, a head on the inner member forming differential pressure surfaces, a piston in the inner member, a rod connecting the piston to the motor, front and rear supply passages in the outer member for introducing pressure field into the ends of the outer member to actuate the inner member, said front supply passage being adapted to constantly supply pressure fluid into the outer member to act against the pressure surface of smaller area, a port in the rear end of the inner member

to admit pressure fluid thereinto for actuating the piston forwardly, a pair of telescopically arranged tubes forming passages for introducing pressure fluid into the front end of the inner member to act against the piston for retracting the piston and the motor, and a throttle valve for controlling the passages.

2. In a feeding device, the combination of a support and a motor slidable on the support, a feeding cylinder comprising inner and outer tubular members arranged telescopically with respect to each other, means for securing the outer member fixedly to the support, a head on the inner member forming differential pressure surfaces, a piston in the inner member, a rod connecting the piston to the motor, front and rear supply passages in the outer member for introducing pressure fluid into the ends of the outer member to actuate the inner member, said front supply passage being adapted to constantly supply pressure fluid into the outer member to act against the pressure surface of smaller area, a port in the rear end of the inner member to admit pressure fluid thereinto for actuating the piston forwardly, a pair of telescopically arranged tubes exteriorly of the members forming passages for introducing pressure fluid into the front end of the inner member to act against the piston for retracting the piston and the motor, and a throttle valve on the outer member for controlling the passages.

In testimony whereof I have signed this specification.

WILLIAM P. VAN EPS.