May 16, 1933. M. C. HUFFMAN 1,909,179

DRILL FEEDING MECHANISM

Filed Dec. 14, 1929

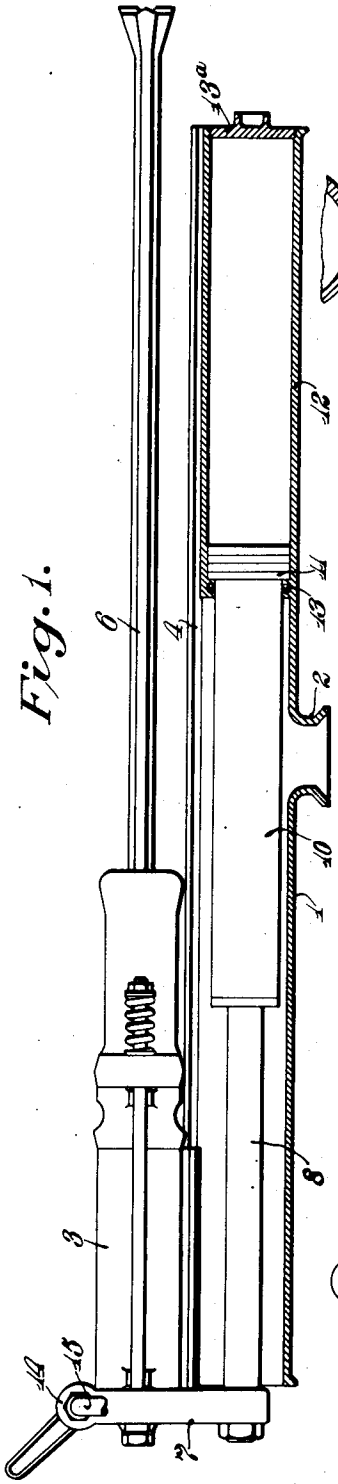


Fig. 1.

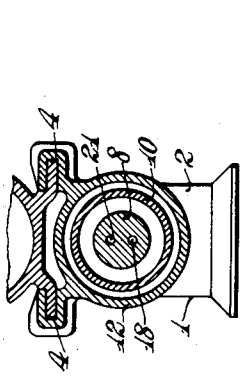


Fig. 3.

Fig. 2.

Fig. 4.

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Patented May 16, 1933 1,909,179

UNITED STATES PATENT OFFICE

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DRILL FEEDING MECHANISM

Application filed December 14, 1929. Serial No. 414,134.

This invention relates generally to pressure fluid operated tools and in the specific embodiment illustrated herein it has particular significance in the field of drilling and is especially related to the means for feeding a drill in an improved manner.

In drilling mechanisms, particularly of the mounted pneumatic hammer type, such as a drifter, it is desirable to feed the drill a considerable distance at one setting of the machine. This permits using a drill steel of considerable length, and thus avoids the necessity of inserting steels of successively greater length as the depth of the hole increases, this procedure being the one usually followed with drills having a relatively short feed.

One object of my invention is to provide an improved feeding mechanism for a mounted drill, while a further and more specific object of the invention is to provide an improved extensible feeding arrangement so disposed with respect to and in association with the mounted drill as to provide an arrangement which is extremely compact, rugged, economical to manufacture and easy to assemble and disassemble and operate.

While other objects and advantages might be mentioned at this point, yet it is believed that the same will be readily apparent from the following description of the accompanying drawing which illustrates, for simplicity, only one embodiment that the invention may take, and in which:

Fig. 1 is a side elevation of a drifter type drill with part of the feeding means being shown in section.

Fig. 2 is an enlarged view of the machine with the feeding mechanism shown in collapsed condition, which is the most forward feeding position attainable, the controlling valve being set so as to return the drill and feeding mechanism to the starting position.

Fig. 3 is a transverse section on line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional view of the feeding control valve in the position for feeding the drill forwardly.

While my invention is illustrated with a drifter type of percussive tool it will, of course, be understood that the various principles and structural features disclosed herein may be employed with other similar mechanisms, but, as will be seen from the following description, the invention is peculiarly adapted to the feeding of a drifter.

The machine comprises in its specific embodiment a shell 1 of exceptional length, having a central support 2 which is normally clamped upon suitable supporting elements well known in the art. The percussive motor 3 is guided in suitable lateral guideways 4 formed near the upper edges of the shell with the motor disposed above the hollow portion of the shell. The motor may be of any usual type which herein is merely diagrammatically illustrated, but it will, of course, be understood the same has a piston operated by air pressure to impart a series of blows to a drill steel 6. This steel is shown of considerable length so as to permit my improved feeding means to effect a continuous feed of substantial distance without requiring a change of steels. To effect this feeding the rear head 7 of the percussive motor extends downwardly between the guideways 4 and has secured at its lower end a piston rod 8 which carries a piston 9 at its forward end, this piston in turn being mounted in a combined cylinder and piston rod 10 which has at its forward end an enlarged head 11 forming a piston slidable within the outermost cylinder 12. It is thus seen that there are a plurality of telescopic cylinders and pistons, all disposed within the hollow of the shell at the forward end thereof, it being noted in particular that the outer cylinder is formed by the wall of the shell. The inner ends of the cylinders are provided with any suitable packing generally indicated at 13 while the

outermost end of the outer cylinder 12 is closed by removable plug 13a.

The air supply passages for extending the multiple piston and cylinder arrangement comprises a control valve 14 connected in any usual manner with an axial fluid pressure inlet 15, from which fluid pressure is supplied through a port 16 to passages 17 and 18 to the right end of the piston 9, fluid in turn passing through a port 19 formed in the otherwise closed end of piston 11, thereby causing a fluid pressure force to be exerted on piston 11 so as to move the same rearwardly toward the starting position for a drilling operation. Piston 11 will move rearwardly the length of cylinder 12 whereupon the pressure acting in the end of the inner cylinder 10 will continue the rearward movement of the drill for the length of the inner cylinder 10. During lengthening of the feeding mechanism the left end of each of the inner and outer cylinders are vented to atmosphere by a port 20, passages 21, 22, groove 23 formed in the periphery of control valve 14, and passage or a port 24.

When it is desired to feed the steel forwardly the control valve 14 is turned substantially 45° to the position shown in Fig. 4, wherein it will be seen that the fluid pressure supply port 16 registers with passage 22, thereby supplying pressure fluid to the left side of piston 9 to feed the same forwardly. When it approaches the forward end of the inner cylinder 10, port 20 will be uncovered to admit fluid to the outer cylinder 12, whereupon the piston 11 will then feed forwardly to complete the feeding stroke. During this operation the right ends of the cylinders are vented to atmosphere by way of a groove 25 and port 26, associated with the control valve.

It is thus seen that I have provided a drifter type drill having an extremely compact arrangement adapted to effect feeding for a distance materially greater than the length of the feeding mechanism when in its collapsed form and at the same time by the location of the plurality of cylinders within the shell of the drifter, many advantages are obtained, such for instance as full protection of the mechanism. Also by having the feeding mechanism disposed at the front end of the shell and having the percussive motor connected at the rear point of the feeding mechanism there is the advantage that as the hole is drilled weight will be accumulated on the front end of the drill, thereby tending to provide a better counter-balance for the percussive action of the motor and thus tend to effect a dynamic balance of the machine as a whole, whereas on the other hand during the setting-up operation of the machine and with the feed cylinders extended the machine has a tendency to be statically balanced about the central clamping member 2 which facilitates handling by the operator. It is also seen that by having the cylinder located within the hollow of the shell and having the wall of the cylinder formed by the shell, a very compact and economical arrangement is provided and which in addition presents a strong and durable structure.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A drifter type of drilling mechanism comprising, in combination, a guide shell, a rock drill slidably guided on said shell, means for feeding said drill relative to said shell comprising a pneumatic feeding motor contained within said shell and including a feed cylinder formed integral with the shell and forming a part of the shell structure, a feed piston reciprocably mounted in said cylinder and having a hollow piston rod forming a second feed cylinder, a feed piston reciprocably mounted in said second feed cylinder and having a piston rod, a connection between said last mentioned piston rod and the rock drill, and means for supplying pressure fluid to said cylinders to effect reciprocation of said pistons including parallel passages formed in said connection and communicating parallel passages formed in said last mentioned piston rod, said last mentioned passages communicating with said second cylinder at opposite sides of said last mentioned feed piston.

2. A drifter type of drilling mechanism comprising, in combination, a guide shell, a rock drill slidably guided on said shell, means for feeding said drill relative to said shell comprising a pneumatic feeding motor contained within said shell and including a feed cylinder formed integral with the shell and forming a part of the shell structure, a feed piston reciprocably mounted in said cylinder and having a hollow piston rod forming a second feed cylinder, a feed piston reciprocably mounted in said second feed cylinder and having a piston rod, a connection between said last mentioned piston rod and the rock drill, and means for supplying pressure fluid to said cylinders to effect reciprocation of said pistons including parallel passages formed in said connection and communicating parallel passages formed in said last mentioned piston rod, said last mentioned passages communicating with said second cylinder at opposite sides of said last mentioned feed piston, and a passage traversing the wall of said second cylinder for supplying fluid from a passage in said last mentioned piston rod through said second cylin-

der into said first cylinder to effect movement of said first mentioned piston in one direction.

3. A drifter type of drilling mechanism comprising, in combination, a guide shell, a rock drill slidably guided on said shell, means for feeding said drill relative to said shell comprising a pneumatic feeding motor contained within said shell and including a feed cylinder formed integral with the shell and forming a part of the shell structure, a feed piston reciprocably mounted in said cylinder and having a hollow piston rod forming a second feed cylinder, a feed piston reciprocably mounted in said second feed cylinder and having a piston rod, a connection between said last mentioned piston rod and the rock drill, and means for supplying pressure fluid to said cylinders to effect reciprocation of said pistons including parallel passages formed in said connection and communicating parallel passages formed in said last mentioned piston rod, said last mentioned passages communicating with said second cylinder at opposite sides of said last mentioned feed piston, and a valve carried by said drill for alternatively connecting said parallel passages with a source of fluid supply and exhaust.

4. A drifter type of drilling mechanism comprising, in combination, a guide shell, a rock drill slidably guided on said shell, means for feeding said drill relative to said shell comprising a pneumatic feeding motor contained within said shell and including a feed cylinder formed integral with the shell and forming a part of the shell structure, a feed piston reciprocably mounted in said cylinder and having a hollow piston rod forming a second feed cylinder, a feed piston reciprocably mounted in said second feed cylinder and having a piston rod, a connection between said last mentioned piston rod and the rock drill, and means for supplying pressure fluid to said cylinders to effect reciprocation of said pistons including parallel passages formed in said connection and communicating parallel passages formed in said last mentioned piston rod, said last mentioned passages communicating with said second cylinder at opposite sides of said last mentioned feed piston, a passage traversing the wall of said second cylinder for supplying fluid from a passage in said last mentioned piston rod through said second cylinder into said first cylinder at one side of said first mentioned piston to effect movement of said first mentioned piston in one direction, and a passage traversing the end wall of said first mentioned piston for conducting fluid from the other of said parallel passages to said first mentioned cylinder at the other side of said first mentioned piston to effect movement of said first mentioned piston in the opposite direction.

5. A drifter type of drilling mechanism comprising, in combination, a guide shell, a rock drill slidably guided on said shell, means for feeding said rock drill relative to said shell comprising a pneumatic feeding motor contained within said shell and including a feed cylinder formed integral with the forward portion of the shell and forming a part of the shell structure, a feed piston reciprocably mounted in said cylinder and having a rearwardly extending hollow piston rod forming a second feed cylinder, a feed piston reciprocably mounted in said second cylinder and having a rearwardly extending piston rod, a connection between the rear end of said last mentioned piston rod and the rear end of the rock drill, and means for supplying pressure fluid to said feed cylinders to effect reciprocation of said pistons including passages formed in said connection and said last mentioned piston rod and a valve carried by the rear portion of the rock drill adjacent said connection for controlling such fluid supply.

6. A reversible pneumatic feeding motor for feeding a rock drill including a feed cylinder, a feed piston reciprocably mounted in said feed cylinder and having a hollow piston rod forming a second cylinder, a feed piston reciprocably mounted in said second cylinder and having a piston rod, and means for supplying pressure fluid to said cylinders to effect feed selectively in opposite directions including passages formed in said last-mentioned piston rod and communicating with the second cylinder at opposite sides of the last mentioned feed piston.

7. A reversible pneumatic feeding motor for feeding a rock drill including a feed cylinder, a feed piston reciprocably mounted in said feed cylinder and having a hollow piston rod forming a second cylinder, a feed piston reciprocably mounted in said second cylinder and having a piston rod, and means for supplying pressure fluid to said cylinders to effect feed selectively in opposite directions including passages formed in said last mentioned piston rod and communicating with the second cylinder at opposite sides of the last mentioned feed piston, and a passage traversing the wall of the second cylinder for supplying fluid from one of said passages to said first mentioned cylinder.

8. A reversible pneumatic feeding motor for feeding a rock drill including a feed cylinder, a feed piston reciprocably mounted in said feed cylinder and having a hollow piston rod forming a second cylinder, a second feed piston reciprocably mounted in said second cylinder and having a piston rod, and means for supplying pressure fluid to said cylinders to effect feed selectively in opposite directions including passages formed in said last mentioned piston rod and communicating with the second cylinder at opposite sides

of the last mentioned feed piston, a passage traversing the wall of the second cylinder for supplying fluid from one of said passages to said first mentioned cylinder at one side of the first mentioned piston to effect movement of the latter in one direction, and a passage connecting the other passage in the second mentioned piston rod with the first mentioned feed cylinder at the opposite side of said first mentioned piston to effect movement of the latter in the opposite direction.

In testimony whereof I affix my signature.

MERVIN C. HUFFMAN.