April 27, 1937. F. M. SLATER 2,078,780

FEEDING DEVICE

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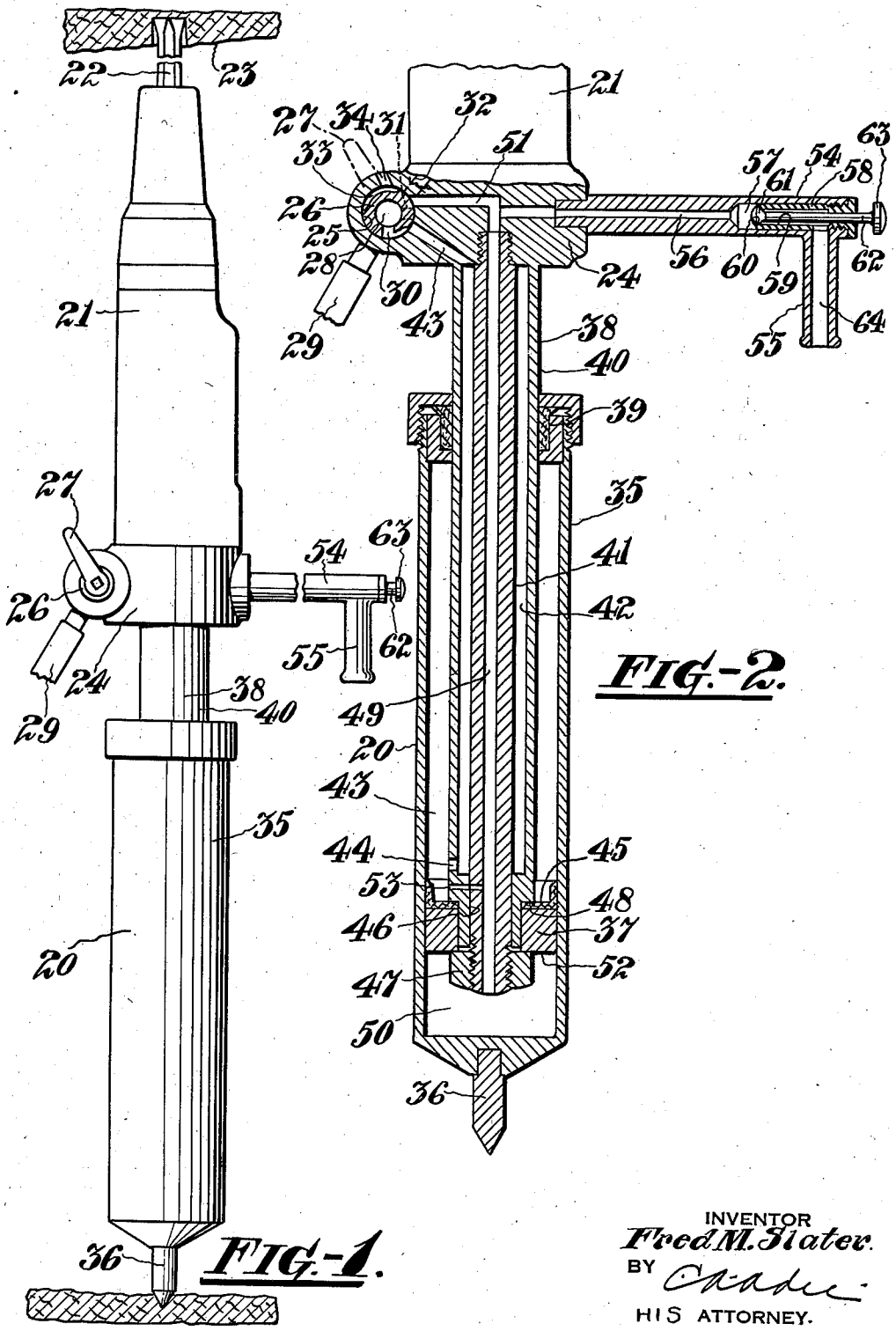

FIG.-2.

FIG.-1.

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FEEDING DEVICE

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3 Claims. (Cl. 121—9)

This invention relates to fluid actuated rock drills, but more particularly to a feeding device for advancing a rock drill of the stoper type in accordance with the penetration of the working implement into the work.

One object of the invention is to render the feeding device readily responsive to the will of the operator whenever changes are required in the pressure actuating the feeding device.

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

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a side elevation of a feeding device constructed in accordance with the practice of the invention and showing it applied to a rock drill, and

Figure 2 is an elevation, in section, of the feeding device.

Referring more particularly to the drawing, 20 designates, in general, the feeding device, and 21 a rock drill which it actuates.

The rock drill 21 may be of the well known hammer type adapted to be actuated by pressure fluid for driving a working implement 22 into the work, as for example the roof 23 of a tunnel or drift.

On the rear end of the rock drill is a head block 24 having a valve chamber 25 containing a throttle valve 26 for controlling the admission of pressure fluid into the drilling mechanism. The throttle valve is of the rotary type having a handle 27 and a chamber 28 which may be in constant communication with a conduit 29 leading from a source of pressure fluid supply (not shown).

The throttle valve controls the admission of pressure fluid to both the feeding device and the rock drill. It is accordingly provided with a pair of ports 30 and 31 of which the port 31, in the open position of the throttle valve, registers with a passage 32 leading from the valve chamber 25 to the pressure fluid distributing element (not shown) of the rock drill 21. The port 30 affords communication between the chamber 25 and the feeding device, and in the periphery of the throttle valve is a groove 33 to communicate the feeding device with an exhaust port 34 leading from the valve chamber to the atmosphere.

The feeding device 20, constructed in accordance with the practice of the invention, comprises a feeding cylinder 35 having, at its lower end a calk or pointer 36 to engage the floor of the drift for supporting the drilling mechanism in the correct operative relationship with respect to the work.

The cylinder 35 contains a piston 37 which is connected to the head block 24 by a rod 38 extending slidably through the head 39 of the feeding cylinder 35. The rod 38 comprises, in the present instance, outer and inner tubular members 40 and 41, both of which are connected to the head block 24.

The tubular member 41 is of smaller diameter than the interior of the tubular member 40 and cooperates therewith to define an annular chamber 42 for pressure fluid, such pressure fluid being conveyed into said chamber by a passage 43 in the head block 24 and opening into the valve chamber 25. A port 44 in the tubular member 40 admits pressure fluid from the chamber 42 into a pressure chamber 43 in the feeding cylinder to act against a reduced pressure area 45 on the piston.

In the lower end of the tubular member 40 is a reduced bore 46 which is in body engagement with the periphery of the adjacent portion of the tubular member 41. The latter member projects from the lower end of the member 40 and a nut 47 is threaded thereon to clamp the piston 37 against a shoulder 48 on the member 40. The interior of the tubular member 41 serves as a passage 49 to convey pressure fluid into an enlarged pressure chamber 50 below the piston 37.

The passage 49 extends entirely through the member 41. It registers with a passage 51 opening into the valve chamber 25 and the pressure fluid conveyed into the chamber 50 by the passage 51 acts against an enlarged pressure surface 52 on the piston 37 to extend the feeding device.

To the end that both pressure chambers 43 and 50 may be simultaneously charged or evacuated whenever either of the chambers are placed in communication with pressure fluid supply or with the atmosphere the rod 38 is provided with a passage 53 located, in the present instance, near the pressure surface 45 in the members 40 and 41 and opening into the chamber 43 and the passage 49. The passage 53 is, however, of small cross-sectional area as compared with the passages conveying pressure fluid to and from the pressure chambers so that transference of fluid from one chamber to the other will take place slowly.

The drilling mechanism is provided with the usual handle 54 for preventing unauthorized rotary movement of the rock drill. The handle is secured to the head block 24 and has a grip portion 55 adapted to be grasped by the operator. In the handle 54 and the head block 24 is

a passage 56 which opens into the passage 51 at one end and at its other end into an enlarged bore 57 in the outer end of the handle 54.

Within the bore 57 is a bushing 58 having an axial passage 59 that opens into the inner end of the bore 57 and terminates in a beveled seat 60 for a valve 61 adapted to control communication between the passages 56 and 59. On the valve 61 is a stem 62 which extends slidably through the bushing 58 to the exterior thereof and carries a button 63 arranged within convenient reach of the grip portion 55 so that the hand grasping the grip portion 55 may also be used for unseating the valve 61. The passage 59, is open to the atmosphere through a passage 64 located in the wall of the bushing 58 and in the grip portion 55.

As a first step in the operation of the device, the throttle valve 26 is rotated to the position illustrated in Figure 2 in which pressure fluid is admitted through the passage 43, the chamber 42 and the port 44 into the chamber 43. The pressure fluid thus admitted into the chamber 43 immediately retracts the feeding device to its shortest possible length and only a small portion of pressure fluid flows through the passage 53 and the passage 49 into the pressure chamber 50 so that the feeding device will not be immediately extended.

The throttle valve is then rotated to bring the port 30 into registry with the passage 51, whereupon pressure fluid flows directly into the chamber 50 and, acting against the pressure surface 52, actuates the piston 37 and the rock drill 21 toward the work. In this position of the throttle valve the port 31 registers with the passage 32 and pressure fluid then flows to the rock drill for actuating its percussive element.

In the event that it becomes necessary to retard or check the advancing movement of the rock drill, as when the working implement becomes stuck or passes through soft strata in the work, the valve 61 is unseated to permit the escape of pressure fluid from the pressure chamber 50. The pressure within the pressure chamber 50 will then be immediately reduced but, owing to the restricted area of the port 53, that within the chamber 43 will remain approximately of the nominal value for a sufficient length of time to enable it to exert a retracting effect on the rock drill and thereby assist in releasing the working implement.

When the occasion for slow feeding movement has passed the valve 61 is released and the pressure surface 52 will then against be subjected to full line pressure for feeding the rock drill toward the work.

After the drill hole has been completed the throttle valve 26 is rotated to a position in which the groove 33 registers with the passage 51 and the exhaust port 34. The chamber 50 is then immediately evacuated and before the pressure fluid in the chambers 43 and 42 may pass through the restricted passage 53, it will act to retract the feeding device and then flows through the restricted passage 53, the passages 49 and 51 and through the groove 33 and the exhaust port 34 to the atmosphere.

I claim:

1. A feeding device for rock drills, comprising a feeding cylinder, a piston in the feeding cylinder having opposed differential pressure surfaces, a rod on the piston connected to the rock drill, differential pressure chambers in the cylinder, a passage in the rod to supply pressure fluid to the smaller pressure chamber, a valve to control the passage, and a restricted passage in the rod affording constant communication between the pressure chambers.

2. A feeding device for rock drills, comprising a feeding cylinder, a piston in the feeding cylinder having opposed differential pressure surfaces, a rod on the piston connected to the rock drill, differential pressure chambers in the feeding cylinder, passages in the rod for conveying pressure fluid to and from the pressure chambers, valve means to control the passages, and a restricted passage in the rod affording constant communication between the pressure chambers.

3. A feeding device for rock drills, comprising a feeding cylinder having opposed differential pressure chambers, a piston in the cylinder, a rod on the piston having passages leading to the pressure chambers to convey pressure fluid to and from the pressure chambers, a throttle valve to control the passages, a relief valve for controlling the passage leading to the larger pressure chamber, and a restricted passage affording constant communication between the pressure chambers.

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