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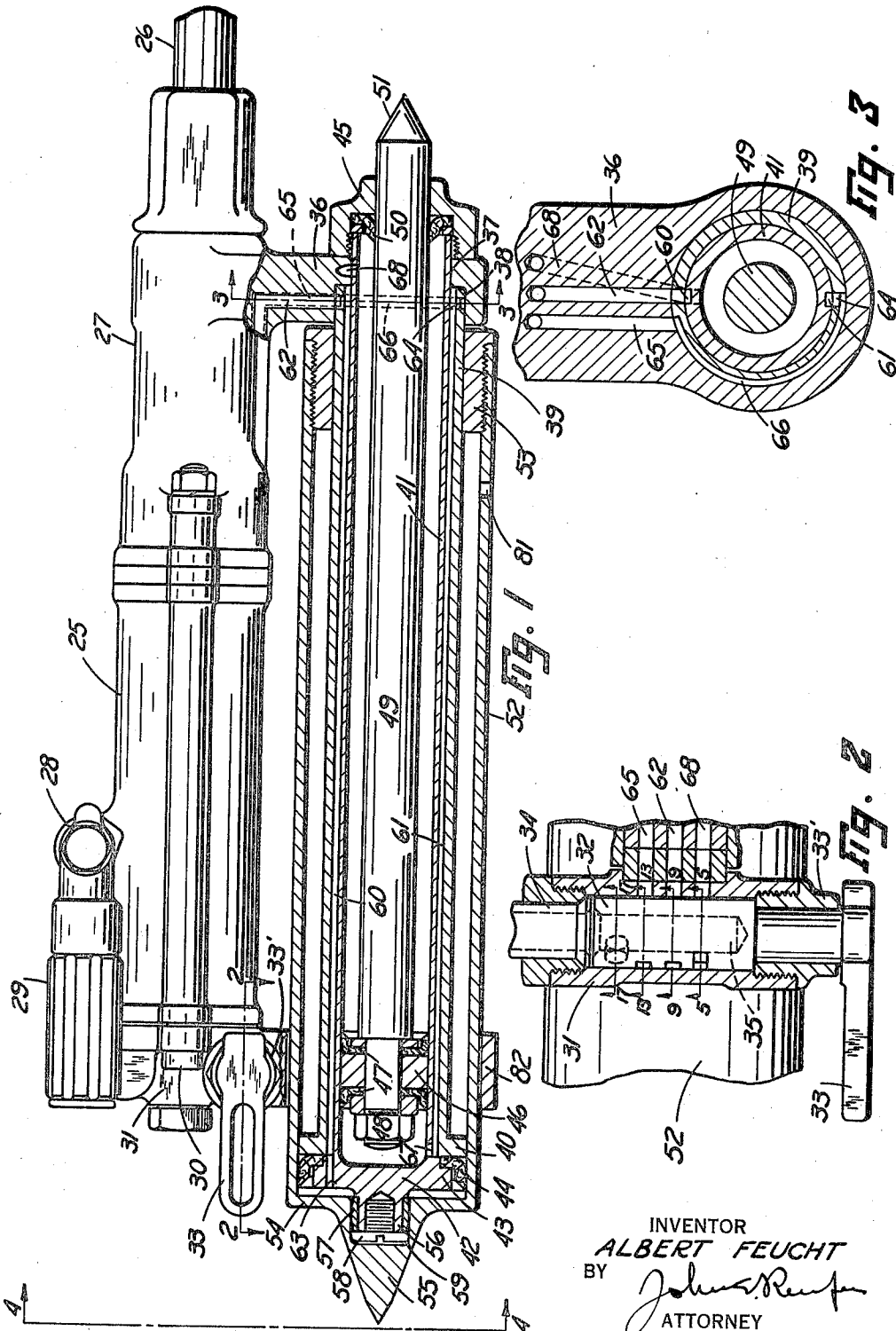
A. FEUCHT

2,208,025

SUPPORTING MEANS FOR ROCK DRILLS

Filed July 26, 1938

3 Sheets-Sheet 1



INVENTOR
ALBERT FEUCHT
BY *John R. Kemp*
ATTORNEY

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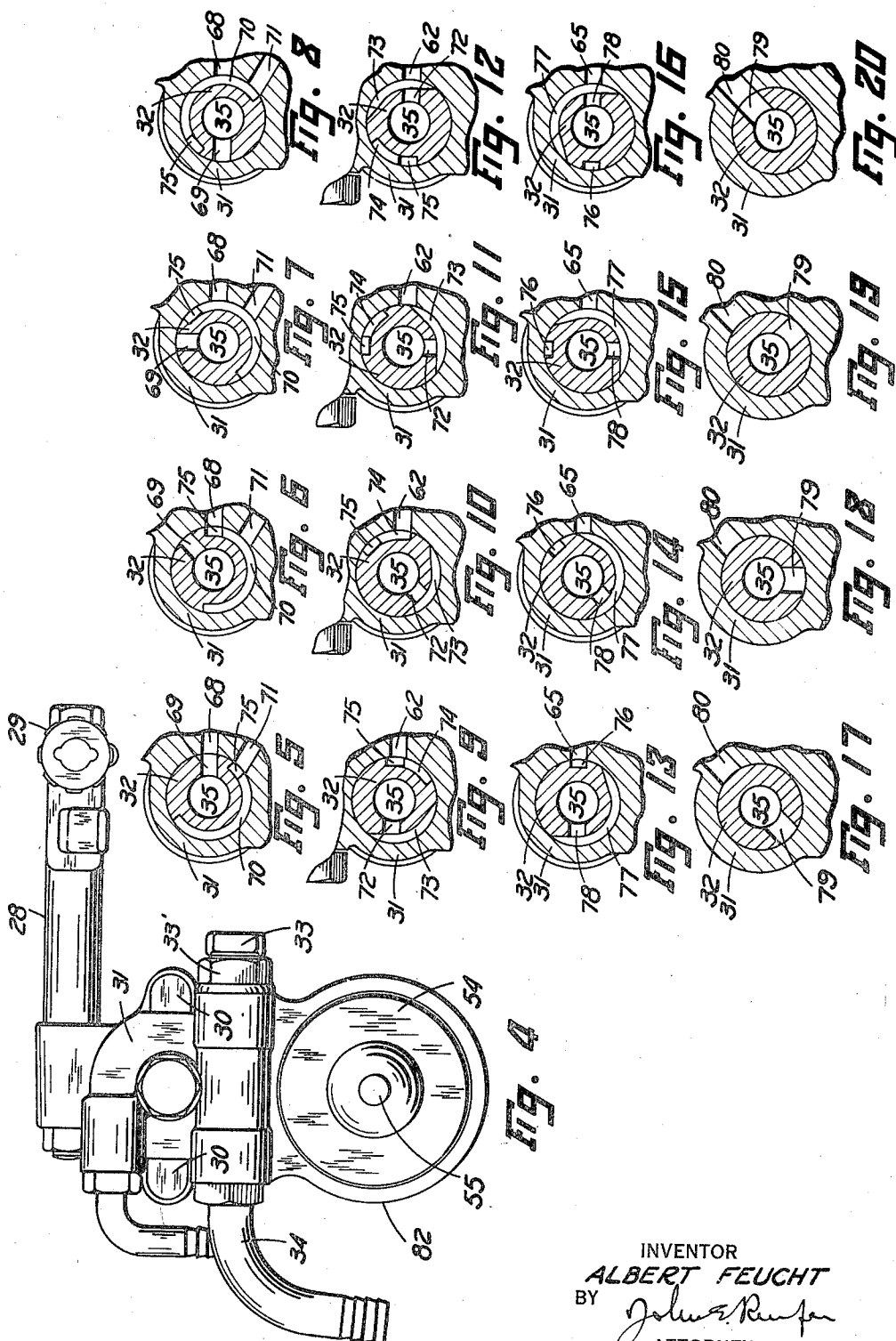
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INVENTOR
ALBERT FEUCHT
BY *John R. Rumpf*
ATTORNEY

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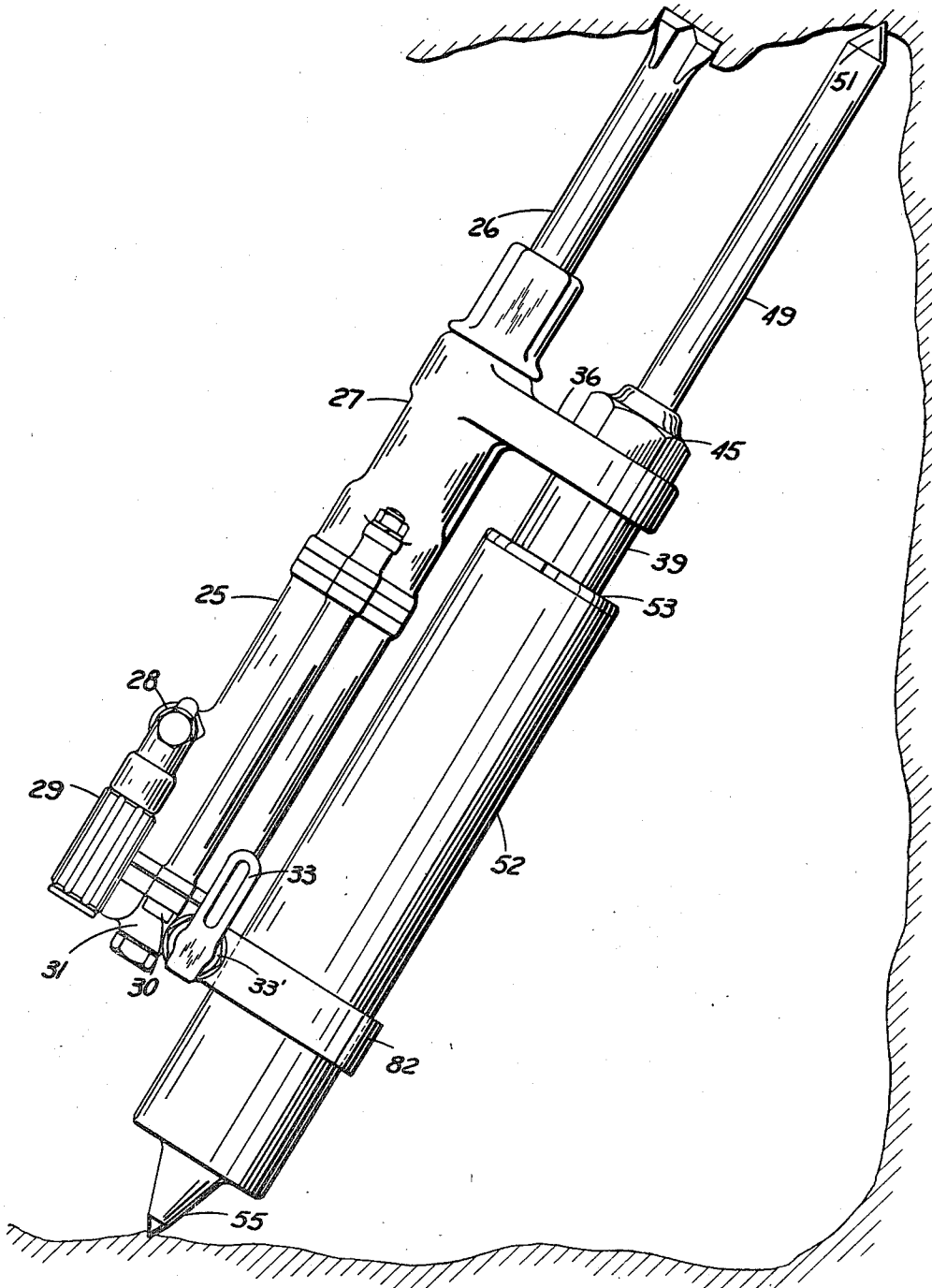


Fig. 21

INVENTOR
ALBERT FEUCHT
BY *John R. Rumpf*
ATTORNEY

UNITED STATES PATENT OFFICE

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SUPPORTING MEANS FOR ROCK DRILLS

Albert Feucht, Garfield Heights, Ohio, assignor
to The Cleveland Rock Drill Company, Cleve-
land, Ohio, a corporation of Ohio

Application July 26, 1938, Serial No. 221,378

7 Claims. (Cl. 255—51)

This invention relates broadly to rock drills, but more particularly to a feeding mechanism for rock drills of the stoper type.

One object of this invention is to produce a stoper drill with an improved feeding mechanism acting as a support for the drill.

Another object of this invention is to provide a stoper drill with self supporting means engageable with the work irrespective of the position of the drill thereon.

Another object of this invention is the production of an improved stoper drill forming a compact assembly, which is strong, durable and efficient.

Other objects and advantages more or less ancillary to the foregoing reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification.

In the drawings:

Fig. 1 is a side elevational view of a stoper drill embodying the invention and shown partly in section to illustrate details of the construction.

Fig. 2 is an enlarged longitudinal view taken in a plane indicated by line 2—2 in Fig. 1.

Fig. 3 is an enlarged cross sectional view taken in a plane indicated by line 3—3 in Fig. 1.

Fig. 4 is an end elevational view looking in the direction of the arrows 4—4 in Fig. 1.

Figs. 5 to 8 inclusive are enlarged cross sectional views taken in a plane indicated by line 5—5 in Fig. 2 illustrating the throttle valve in different position.

Figs. 9 to 12 are views similar to Figs. 5 to 8 but taken in a plane indicated by line 9—9 in Fig. 2.

Figs. 13 to 16 are views similar to Figs. 5 to 8 but taken in a plane indicated by line 13—13 in Fig. 2.

Figs. 17 to 20 are also views similar to Figs. 5 to 8 but taken in a plane indicated by line 17—17 in Fig. 2.

Fig. 21 is a side elevational view of a rock drill embodying the invention shown in operation.

Referring to the drawings in which like symbols designate corresponding parts throughout the several views, 25 represents the usual fluid actuated drilling motor having a drill steel 26 slidable within the front housing 27 and rotated by the usual rotation mechanism (not shown). Intermediate its ends, the motor is provided with the usual handle 28 extending laterally therefrom and carrying a hand grip 29 rotatable for controlling the rotation of the drill steel 26. To the

rear end of the drilling motor 25, there is secured by bolts 30 a back head 31 having a throttle valve 32 rotatable therein by a handle 33 made integral therewith, and held against axial movement in one direction by a nut 33' and in the other direction by a fluid connection 34 through which motive fluid may be admitted into a central bore 35 formed in the throttle valve 32.

Depending from the front housing 27, there is a relatively large lug 36 having a bore 37 extending therethrough parallelly with the center axis of the drilling motor 25 and formed with a counterbore 38 having seated therein one end of a tubular piston rod 39, which piston rod extends under the drilling motor 25 and has its other end formed with a piston 40. Located within the tubular piston rod 39, there is an inner tube 41 having its left end in Fig. 1, hereinafter referred to as the lower end of the assembly, extending through the piston 40 and closed by an integral cap 42, which cap is formed with an external annular flange 43 engaging a cup shaped packing ring 44 located on the adjacent end wall of the piston 40. The upper end of the inner tube 41 is externally threaded and extends through the lug 36 to receive a nut 45 engaging the lug 36 for rigidly securing the tubular piston rod 39 and tube 41 to the lug 36 while clamping the packing 44 between the piston 40 and the annular flange 43.

Slidable within the inner tube 41, there is a piston 46 carrying on each side thereof a cup-shaped packing 47 in fluid tight engagement with the tube 41. To the piston 46 is operatively secured by a nut 48 a guide rod 49 extending through the nut 45, which nut carries a packing 50 in fluid tight engagement with the rod 49. The upper end of the rod is preferably pointed as at 51 for operative engagement with the work as will be explained later.

Surrounding the tubular piston rod 39, there is a feed cylinder 52 closed at its upper end by a removable bushing 53 affording a sliding bearing for the tubular rod 39, while the lower end of the cylinder 52 is closed by a bottom plate 54 made integral therewith and formed with a point 55. The cap 42 closing the lower end of the inner tube 41 is provided with a shank 56 depending therefrom and carrying thereon a split ring 57 secured against axial movement by a cap screw 58. This split ring is capable of frictional engagement with the inner wall of a bore 59 formed within the point 55 of the plate 54.

Extending longitudinally between the tubular piston rod 39 and the inner tube 41, there are

two diametrically opposed passageways 60 and 61, the passageway 60 having its upper end opening into a passage 62 formed within the lug 36, while its lower end opens into the cylinder 52 through a piston port 63. Within the lug 36, the passageway 61 is connected with the exterior of the tubular piston rod 39 by a short port 64, and therefrom to a passage 65 also formed in the lug 36 by a semicircular groove 66, while the lower end of this passageway is opening into the inner tube 41 through a short port 67. Opening into the upper end of the inner tube 41, there is a passage 68 also located within the lug 36 but in a plane different from that of the passages 62 and 65. From the lug 36, the three passages 62, 65 and 68 extend longitudinal within the side wall of the drilling motor 25 to end at the throttle valve 32, where they are located in three different planes as clearly shown in Fig. 2.

Adjacent the passage 68, the throttle valve 32 is formed with an inlet port 69 and a semicircular exhaust groove 70 in communication with an exhaust port 71 formed within the back head 31. Adjacent the passage 62, the throttle valve 32 is provided with an inlet port 72 capable of communication with the passage 62 via a V-shaped groove 73 formed on the valve, while the port 72 is also capable of communication with the exhaust port 71 through a semicircular exhaust groove 74 which communicates with the exhaust groove 70 through a longitudinally disposed slot 75. Affording communication of the exhaust groove 74 with the third passageway 65, there is a second longitudinally disposed slot 76, while the passageway 65 is capable of communication with a semicircular V-shaped groove 77 having an inlet port 78 opening therein. Toward the motive fluid connection 34, the throttle valve 32 is provided with a fourth inlet port 79 capable of communication with a passage 80 formed in the back head 31 for admitting motive fluid into the drilling motor 25. Adjacent the bushing 53, the feed cylinder 52 is also provided with an exhaust port 81, the purpose of which will be explained later.

Depending from the back head 31 and made integral therewith, there is a large ring 82 slidable over the feed cylinder 52 for guiding the drilling motor 25 against lateral movement relative thereto.

In the operation of the mechanism, let it be assumed that motive fluid is admitted through the motive fluid connection 34 into the throttle valve bore 35, and that the throttle valve is positioned as shown in Figs. 6, 10, 14 and 18. In this instance motive fluid from the throttle valve bore 35 will be slowly admitted into the passage 65 via the inlet port 78 and groove 77 (Fig. 14), and from the passage 65 into the lower end of the inner tube 41 via the groove 66, the port 64 (Fig. 3), the passageway 61 and the port 67. In the inner tube 41, the motive fluid acting on the piston 46 will cause the telescopic movement of the rod 49 into engagement with one wall of the work as shown in Fig. 21, while the pointed end 55 of the cylinder 52 engages the ground or another wall of the work. The cylinder 52 and the guide rod 49, hereinafter referred to as the telescopic support, may thus be jammed between walls of the work for carrying the drilling motor slidable thereon. During the expansion of the telescopic support, it will be noticed that the inner cylinder 41 between the piston 46 and the lug 36, is exhausted via the passage 68, the exhaust groove 70 and the exhaust port 69 (Fig.

6), while the inlet port 79 is out of communication with the passage 80 (Fig. 18) to prevent operation of the drilling motor, and the feed cylinder 52 is in communication with the atmosphere via the exhaust groove 74 (Fig. 10), which groove communicates with the exhaust port 69 through the slot 75.

When it is desired to feed the drilling motor to the work, the throttle valve 32 may be positioned as shown in Figs. 7, 11, 15 and 19. In this position of the throttle valve, the groove 73, having motive fluid supplied thereto from the throttle valve bore 35 through the port 72, is in part communication with the passage 62 (Fig. 11) for slowly admitting motive fluid into the passageway 60 and therefrom into the lower end of the feed cylinder 52 via the port 63. In the feed cylinder 52, the motive fluid will act on the piston 40 to gradually drive the piston rod 39 and the inner tube 41 out of the cylinder 52, thereby imparting feeding motion to the drilling motor 25 relative to the feed cylinder 52. During this feeding motion of the drilling motor, the throttle valve inlet port 78 is still in communication with the passage 65 via the groove 77 (Fig. 15), thereby admitting motive fluid into the inner tube 41 for maintaining the guide rod 49 and consequently the support in operative engagement with the work. As the bottom end 42 of the inner cylinder 41 moves toward the piston 46, the motive fluid within the lower end of the inner tube 41 will be subjected to a gradually increasing pressure, which, when greater than that of the motive fluid supplied to the throttle valve 32, will remain constant by forcing motive fluid to back out of the inner tube 41 through the port 67 and the passageway 61, thereby subjecting the piston 46 and consequently the guide rod 49 to a greater pressure than that actuating the feeding mechanism. As the drilling motor is slowly fed to the work, the inner tube 41 between the piston 46 and the lug 36 is still exhausted through the passage 68, the throttle valve groove 70 and the exhaust port 71 (Fig. 7), while the throttle valve port 79 is still out of communication with the port 80 (Fig. 19) for preventing operation of the drilling motor 25.

After the drilling motor has been fed to cause contact of the drill steel 26 with the work, the throttle valve 32 may be positioned as shown in Figs. 8, 12, 16 and 20. In this instance, the throttle valve port 79 is in communication with the port 80 (Fig. 20) for supplying motive fluid to the drilling motor and causing its operation. Simultaneously motive fluid is still admitted to the piston of the guide rod 49 via the port 78, the groove 77 and the passage 65 (Fig. 16), while the feed piston 46 is also supplied with motive fluid via the port 72, the groove 73 and the passage 62 (Fig. 12), which passage as above explained leads into the lower end of the feed cylinder 52 via the passageway 60 and the port 63, thereby causing, during operation of the drilling motor 25, the telescopic support to remain in operative engagement with the work while the drilling motor is fed to the work as the drilling operation proceeds. During this drilling operation, the inner tube 41 between the piston 46 and the lug 36 is still exhausted via the passage 68, the groove 70 and the exhaust port 71 (Fig. 8), while air within the feed cylinder 52 between the piston 46 and the bushing 53 is free to exhaust through the vent 81.

After the drilling operation, when it is desired to collapse the assembly into the position shown

in Fig. 1, the throttle valve 32 may be positioned as shown in Figs. 5, 9, 13 and 17. In this instance, the motive fluid previously admitted into the feed cylinder 52 is free to exhaust therefrom via the port 63, the passageway 60, the passage 62 and the slot 75 (Fig. 9), which slot is in communication with the exhaust port 71, thereby enabling the drilling motor 25 together with the tubular piston rod 39 and the inner tube 41 to drop into the position shown in Fig. 1. Simultaneously, the motive fluid previously admitted into the lower end of the inner tube 41 is free to exhaust therefrom via the port 67, the passageway 61, the port 64 and groove 66 (Fig. 3), the passage 65 and the slot 76 (Fig. 13), which slot is in communication with the exhaust port 71. In this instance, to cause retraction of the telescopic frame, motive fluid is admitted into the inner tube 41 between the piston 46 and the lug 36 via the throttle valve inlet port 68 and the passage 68 (Fig. 5), thereby causing motive fluid to act on the upper side of the piston 46 for driving it together with the guide bar 49 into the position shown in Fig. 1. In this last position of the throttle valve, it will be noticed that the throttle valve inlet port 73 is out of communication with the port 68, thereby preventing operation of the drilling motor 25.

Due to the connections between the drilling motor 25 and its feeding mechanism, which connections include the lug 62 and the ring 82, it will be understood that the drilling motor is capable of revolving around the cylinder 52, thereby enabling the operator holding the hand grip 29 of the handle 28 to move the drilling motor around the feed cylinder into the desired drilling position. Once the drill steel has penetrated the rock or work sufficiently to prevent accidental jumping of the drill steel out of the drill hole, the operator may remove his hand from the handle 25, in which instance rotation of the drilling motor 25 around the feed cylinder 52 is prevented by the drill steel 26.

When the assembly is in the retracted position shown in Fig. 1, the drilling motor 25 may be lifted and moved about with the feed cylinder 52 locked against slidable movement relative thereto due to the frictional engagement of the split ring 57 with the inner wall of the bore 59.

Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In an apparatus of the class described, a

drill support including fluid actuated telescoping elements movable into operative engagement with walls of the work, a drilling motor slidable on said support, and fluid actuated means within said support connected to said motor for imparting slidable movement thereto.

2. In an apparatus of the class described, a drill support including a cylinder, a fluid actuated rod slidable therein extending through one end thereof, said cylinder and rod being engageable with walls of the work for axially jamming said support therebetween, a drilling motor slidable on said support, and fluid actuated means within said cylinder connected to said motor for transmitting feeding motion thereto.

3. In an apparatus of the class described, a fluid actuated telescopic support adapted to be axially jammed between walls of the work, a drilling motor carried by said support slidable relative thereto, and fluid actuated feeding means within said support including a piston connected to said motor for imparting feeding motion thereto.

4. The combination with a drilling motor, of a feeding mechanism therefor including a ground engaging cylinder, a fluid actuated tube slidable within said cylinder connected to said motor, and fluid actuated means telescoping within said tube engageable with a wall of the working face in cooperation with said cylinder for supporting said motor.

5. In a rock drilling apparatus, the combination with a fluid actuated telescoping support having its opposite ends engageable with walls of the rock, of a drilling motor slidable on the support, of a feeding mechanism within said support connected to said motor for imparting a feeding motion thereto, passages for admitting motive fluid into said support for actuating the same and said feeding mechanism, and a single valve for controlling said passages in a manner causing telescopic movement of said support in one direction prior to the operation of said feeding mechanism.

6. In a rock drilling apparatus, a support including a pair of fluid actuated telescoping elements, a drilling motor slidable relative to said support, and a fluid actuated feed member slidable between said elements and connected to said motor.

7. In an apparatus of the class described, a drill support including two telescopically mounted elements movable into operative engagement with walls of the work, a drilling motor slidable on said support, and fluid actuated feeding means for said motor including a tubular member connected to the motor and slidable between said elements.

ALBERT FEUCHT.