April 3, 1956 G. GATTI 2,740,610

ROCK DRILLING APPARATUS

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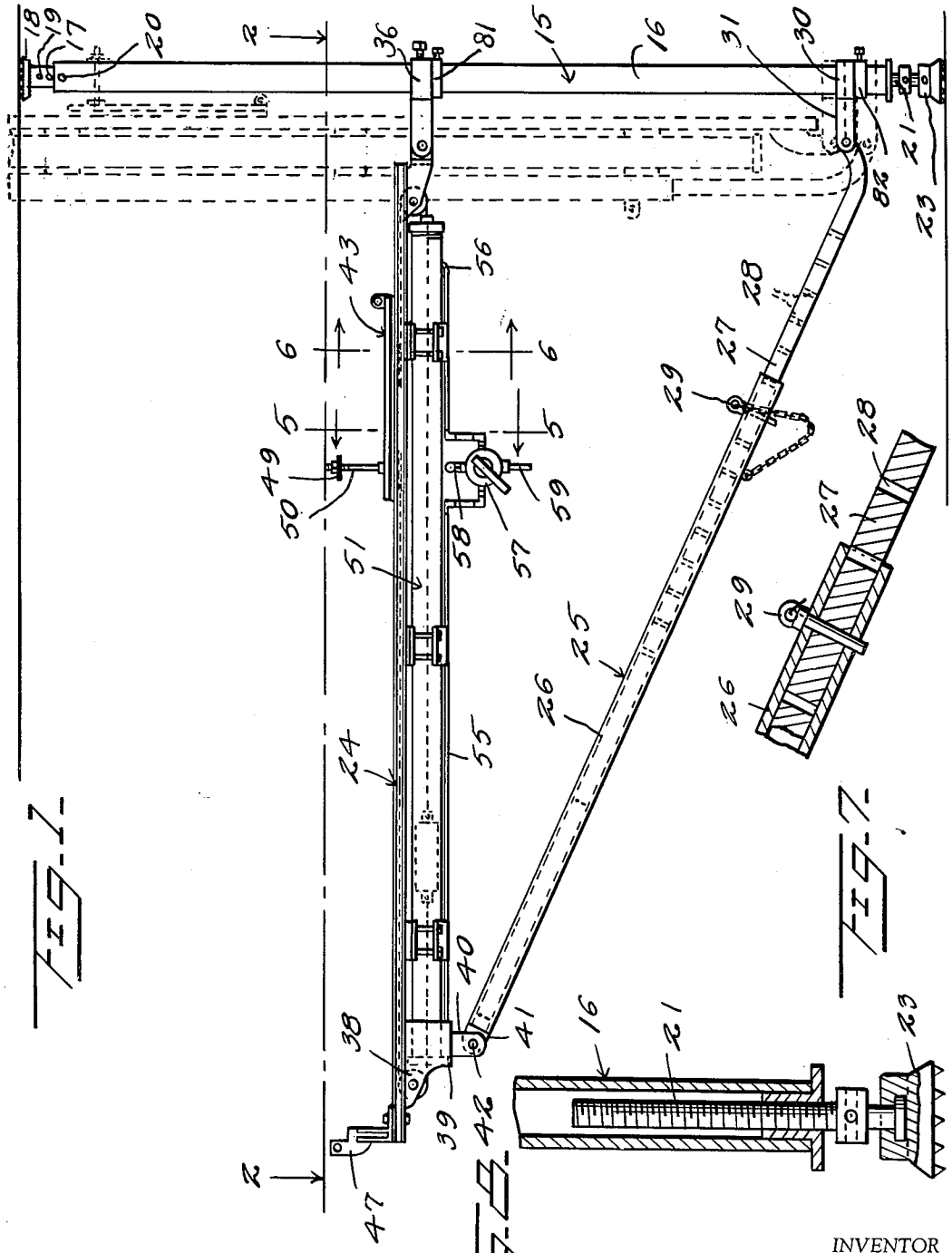


FIG. 1

FIG. 3

FIG. 2

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ROCK DRILLING APPARATUS

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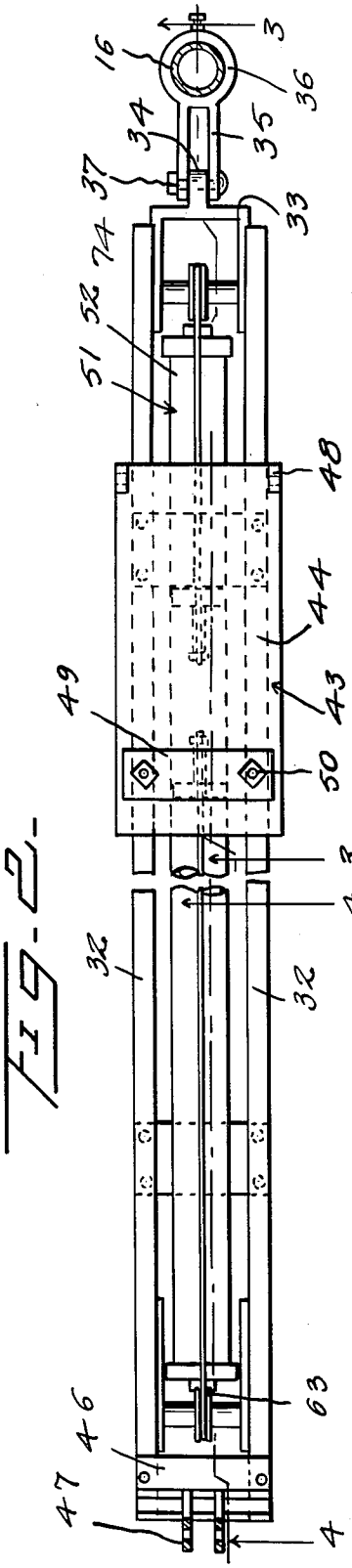


FIG. 2.

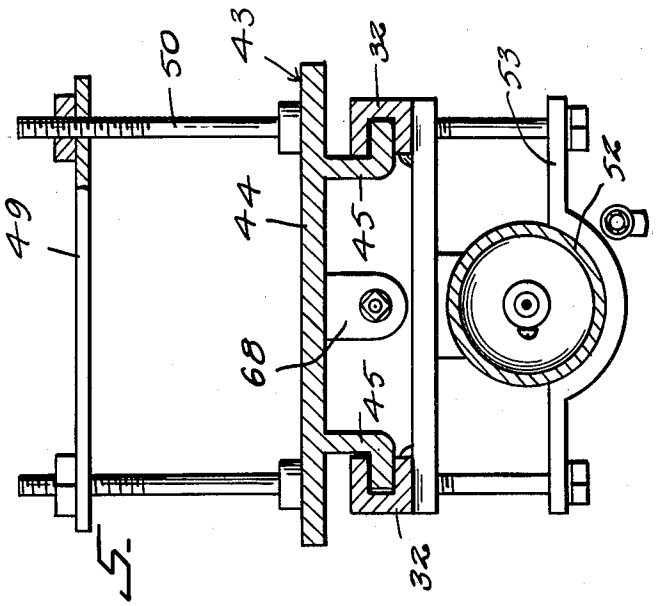


FIG. 5.

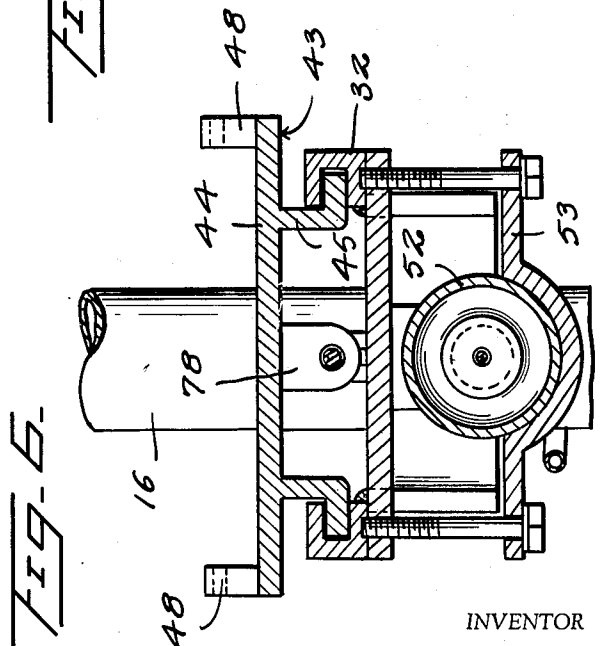


FIG. 6.

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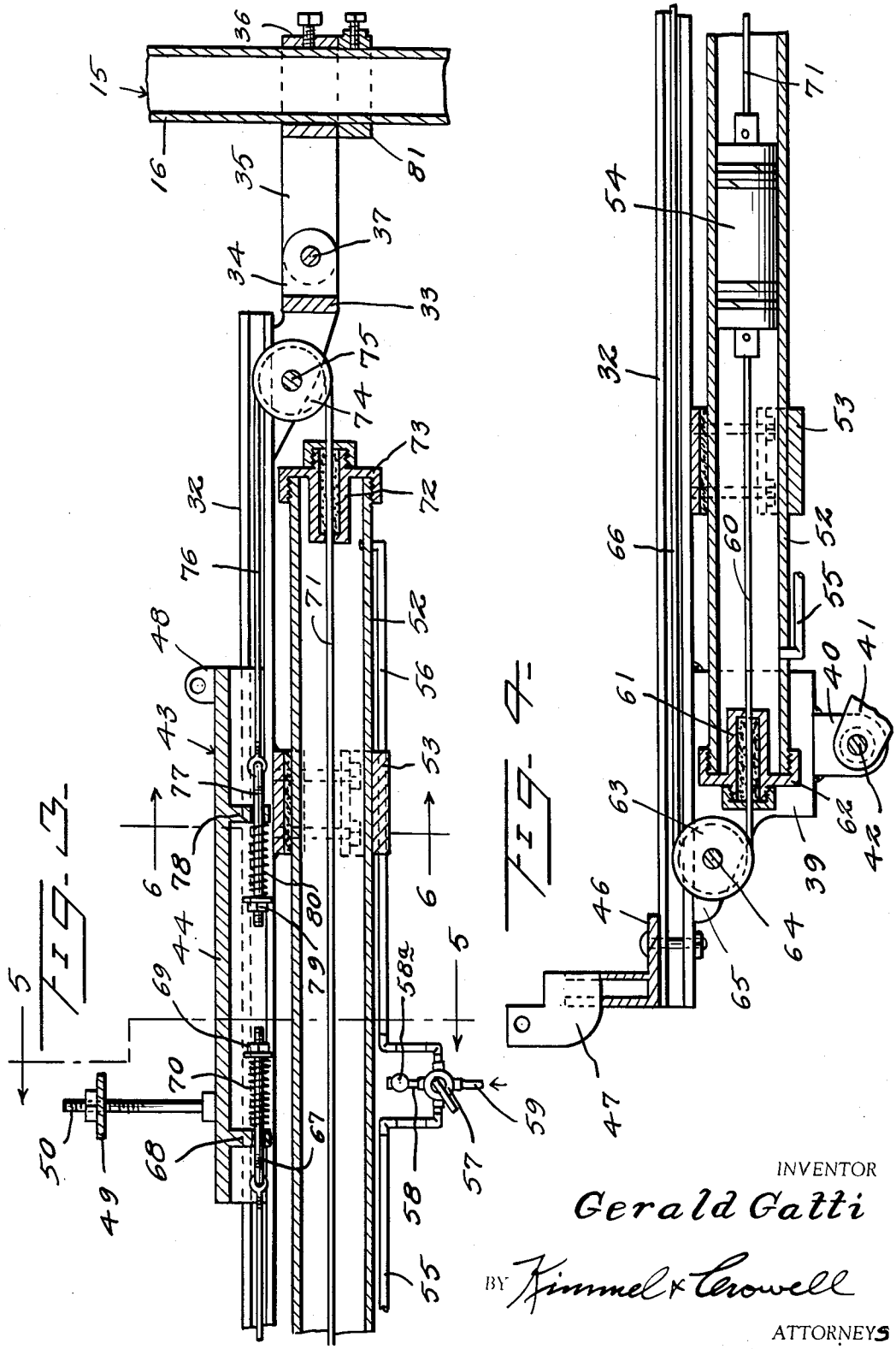


FIG. 3

FIG. 4

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ROCK DRILLING APPARATUS

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Fig. 9.

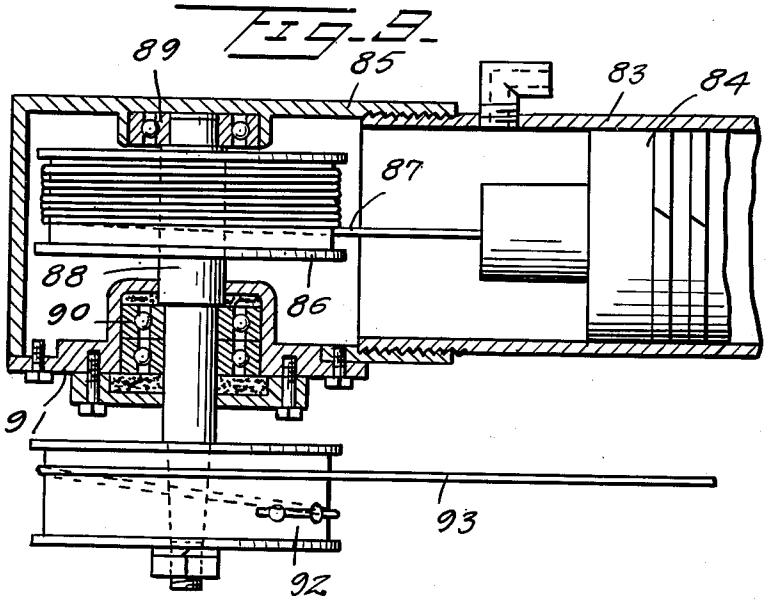


Fig. 10.

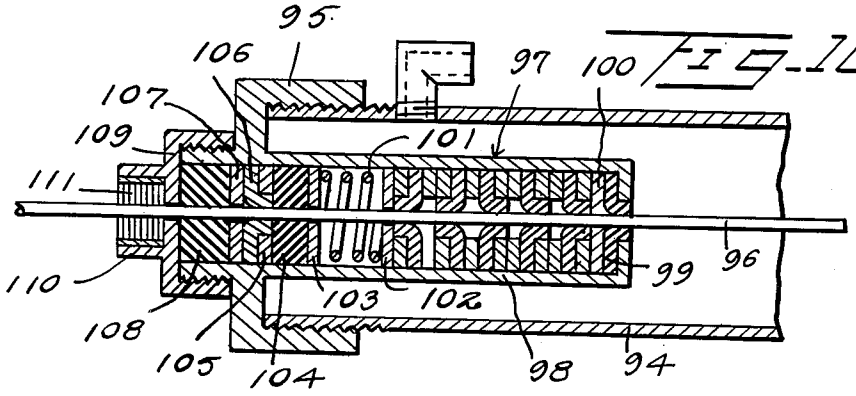
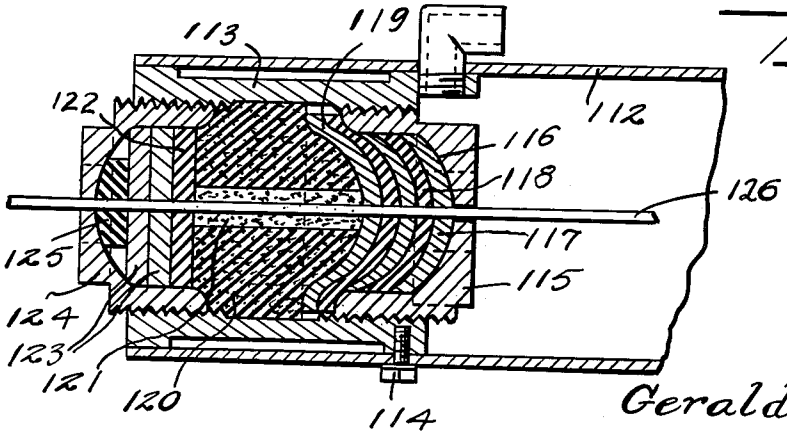


Fig. 11.



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United States Patent Office 2,740,610 Patented Apr. 3, 1956

2,740,610

ROCK DRILLING APPARATUS

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Application June 1, 1953, Serial No. 358,654

2 Claims. (Cl. 255—51)

This invention relates to drilling apparatus for rock, coal or the like.

In the mining of rock, coal or the like, holes are drilled into the material to receive blasting charges, and various types of drilling machines are used. These machines are quite heavy and various kinds of supporting devices are used for supporting the machines during the drilling operations. In certain instances the supports are of such construction that the drilling operation is limited both as to the direction in which the holes may be drilled and as to the depth of the holes.

The device herein disclosed is a mechanical device, operated by compressed air, designed for use as an automatic feeding mechanism for all types of rock and mineral drilling and preparation for blasting or otherwise and also for use in any machine, mechanism or rig wherein the movement over a designated machine distance of a part of said machine can be profitable and practically controlled and activated by means of the operation of compressed air through a rigid tube actuated and controlled by a flexible piston rod. The principle involved in actuating this mechanism is air pressure in a cylinder acting upon a double action piston, having flexible piston rods instead of the customary solid type piston rods. These cablerods are attached to each end of the double acting piston. These cablerods then pass through a packing box at each end of the cylinder and immediately beyond the packing box pass around a pulley located at each end of the cylinder. After passing around the pulley, the forward cablerod is attached to the front of a cradle which carries the particular type of machinery involved, and the reverse cable rod is attached to the rear of said cradle.

It is therefore an object of this invention to provide a supporting means for a drilling machine which will permit the drilling machine to drill holes to a maximum depth, and the holes may be drilled in either the side walls, roof or floor of the mine, and at any selected angle.

Another object of this invention is to provide a support for a drilling machine which includes means for moving the machine forward during the drilling operation and for withdrawing the drill bit when the drilling operation has been completed.

A further object of this invention is to provide an improved feeding means for a drilling machine wherein the feeding of the machine is accomplished by means of fluid under pressure and the fluid may be either air or liquid.

A further object of this invention is to provide an improved feeding and supporting means which can be collapsed to occupy only a small space when not in use.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a detailed side elevation of a drill supporting means constructed according to an embodiment of this invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a sectional view taken on the line 5—5 of either Figures 1 or 3.

Figure 6 is a sectional view taken on the line 6—6 of either Figure 1 or 3.

Figure 7 is a fragmentary longitudinal section of the extensible brace.

Figure 8 is a fragmentary vertical section of the lower end supporting post.

Figure 9 is a fragmentary horizontal section of a modified form of this invention.

Figure 10 is a fragmentary horizontal section of another modification of this invention.

Figure 11 is a fragmentary horizontal section of a further modification of this invention.

Referring to the drawings and first to Figures 1 to 8 inclusive, the numeral 15 designates generally a vertically disposed supporting post which is formed of an elongated tube 16 having adjustably disposed in the upper end thereof, a shaft 17 provided with a toothed head 18 at its upper end. The head 18 is adapted to bite into the ceiling of the mine to hold the upper end of the post against movement. The shaft 17 is provided with spaced openings 19 through which a securing pin 20 extending through the tubular member 16 is adapted to engage. The lower end of the post 16 has threadably disposed therein, a shaft 21 which is swivelly mounted at its lower end in a toothed foot 23 for biting engagement with the floor of the mine.

A laterally extending tool supporting means generally indicated at 24 is adjustably secured at its inner end on the post 16 and extends laterally or outwardly from the post. The tool supporting member 24 is adjustably secured in a laterally projecting position with respect to the post 16 by an extensible brace 25 which includes a tubular member 26 and a telescopic member 27 formed with spaced openings 28.

A pin 29 extends through the tubular member 26 and through selected ones of the openings 28. The lower or inner end of the brace member 25 is pivotally secured to a collar 30 having a pair of outwardly projecting arms 31 between which the inner telescopic member 27 is adapted to be pivotally secured. The supporting member 24 is formed of a pair of confronting U-shaped tracks or guides 32 which are connected together at their inner ends by a connecting member 33 having a lug 34 which engages between a pair of arms 35. The arms 35 extend from a collar 36 which loosely engages about the post 16 and the arms 35 are secured to the lug 34 by means of a pivot bolt 37.

The outer ends of the rails 32 are connected together by means of a connecting member 38, and the connecting member 38 includes a bushing 39 disposed below the rails or guides 32. The bushing 39 has projecting downwardly therefrom a pair of ears 40 between which a lug 41 carried by the brace 25 is adapted to engage, and the lug 41 is pivotally secured between the ears 40 by means of a pivot bolt 42. A carriage 43 is disposed above the rails 32 and is formed of a plate 44 having a pair of oppositely disposed L-shaped slide members 45 extending therefrom and engaging the U-shaped rails or guides 32. The forward ends of the rails 32 have secured therebetween a plate 46 having a pair of spaced upwardly projecting guide bars 47, between which the drill steel of the tool is adapted to engage.

The plate 44 of the carriage has extending upwardly from the rear thereon a pair of ears 48 between which the rear portion of the drilling tool is adapted to rockably

engage, and the tool is clamped to the plate 44 by means of a clamping bar 49 which engages a pair of upstanding bolts 50 which are secured to the plate 44.

In order to provide a means whereby the tool, which is mounted on the carriage 43, may be moved forwardly to feed the drill into the strata, I have provided a tool operator generally indicated at 51. The operator comprises a cylinder 52, which is clamped below and in parallel relation to the rails 32 by means of clamping bars 53. The cylinder 52 has a piston 54 slidable therein and the piston 54 is moved rearwardly to pull the carriage forwardly by fluid pressure which is discharged into the cylinder 52 from a forward pressure pipe 55. A rear pipe connection 56 discharges into the rear of the cylinder 52 for moving the piston 54 forwardly and thereby retracting the carriage 43 as will be hereinafter described.

The pipes 55 and 56 are connected to a conventional four way valve structure 57 of conventional construction and a bleed line 58 extends from the valve structure 57. The bleed line 58 may have a cutoff or regulating valve 58*a* interposed therein, whereby the exhaust of air may be retarded to thereby relieve the pressure on carriage 43 particularly where fitchery is encountered in the drilling operation. The valve structure 57 is connected to a source of fluid pressure supply by means of a flexible tubular member 59.

The piston 54 has connected to the front end thereof a flexible member 60 which extends through packing gland 61 carried by a cap 62. The flexible member 60 is then trained about the grooved pulley 63 which is rotatably carried by a shaft 64 disposed between a pair of ears 65 extending from the bushing 39 and fixed relative to the forward ends of the rails 32. The flexible member 60 is then extended rearwardly as indicated at 66 and is secured to a spring pressed bolt 67 engaging through an apertured ear 68 which projects downwardly from the plate 44 of the carriage 43.

The bolt 67 is tensioned so as to maintain the flexible member 60 taut by means of a nut 69 which bears against a spring 70 engaging about the bolt 67. The opposite end of the piston 54 has secured thereto one end of a carriage retracting cable or flexible element 71, and flexible member 71 extends through a gland 72 carried by a rear end cap 73 mounted on the cylinder 52. The flexible member 71 engages about a rear grooved pulley 74 rotatably mounted on a shaft 75, and flexible member 71 extends forwardly from a pulley 74 as indicated at 76. The forward end of extension 76 is secured to a spring pressed bolt 77 which loosely engages through a depending ear 78 carried by a plate 44. The bolt 77 is tensioned, and flexible member 71 with extension 76 are maintained taut by means of a nut 79 threaded on bolt 77 and engaging a spring 80.

The tool supporting member 24 is adjustably disposed in a horizontal position or at an angle to the vertical by means of a collar 81 which is adjustably mounted on the post 16 and bears against collar 36. Collar 30 is also vertically adjusted on the lower portion of post 16 by means of a collar 82 which is vertically adjusted on the lower portion of post 16.

Referring now to Figure 9, there is disclosed the modified form of this invention, wherein the cylinder 83 has a piston 84 slidable therein, similar to piston 54. The cylinder 83 has mounted at each end thereof a cap 85 within which a pulley or drum 86 is rotatably disposed. The drum or reel 86 has wound thereabout a cable 87 which is secured at one end on the drum 86, and is secured to the other end, on one end of the piston 84.

The drum 86 is fixed on a shaft 88 which journalled in a bearing 89 carried by the cap 85 and projects through a combined bearing and gland 90 carried by a cap plate 91. The outer end of the shaft 88 has fixed thereto a reel or drum 92 about which a flexible member 93 is wound and flexible member 93 is connected to a carriage similar to carriage 43.

Referring now to Figure 10, there is disclosed another modified form of a seal for the opposite ends of the hydraulic cylinder here designated as cylinder 94. As shown herein, a cap 95 is threadedly connected to each end of the cylinder 94 and a flexible member 96 extends concentrically through the cap 95 and is sealed by means of a gland generally indicated at 97. The gland 97 comprises a cylindrical body 98 carried by and projecting inwardly from cap 95, and body 98 has disposed therein a series of leather washers 99 between which metal washers 100 are disposed. The leather washers 99 are under spring tension from a spring 101, and spring 101 is disposed between a pair of washers 102 and 103. Washer 103 bears to its outer side against a rubber washer 104, and a metal washer 105 bears against the outer side of washer 104. An outer leather washer 106 bears against the outer side of washer 105 and a metal washer 107 bears against the outer side of washer 106. A relatively thick rubber washer 108 bears against metal washer 107 and against the inner side of a small cap or bushing 109 which is threaded onto cap 95. Cap 109 is formed with a cylindrical bushing 110 projecting outwardly therefrom and a brush 111 is carried by bushing 110 and engages the flexible member 96 so as to keep this member 96 clean as member 96 is moved inwardly into cylinder 94 through the gland 97.

Referring now to Figure 11 there is disclosed another modified form of sealing means for the opposite end of the cylinder 112, which is similar to cylinder 52. The cylinder 112 has mounted in each end thereof a sleeve 113 which is secured in the end of cylinder 112 by fastening means 114. The sleeve 113 has threaded into the inner end thereof a cup-shaped cap 115 formed with a concave outer side 116. A series of leather washers 117 of concavo-convex configuration are disposed in the cap 115, and rubber washers 118 are interposed between pairs of leather washers 117. An outer concave-convex metal washer 119 bears against the outer one of the rubber washers 118, and the outer concave side of washer 119 has engaging therein a relatively thick rubber packing 120. The packing 120 has disposed in the center thereof a graphite packing 121. A disk shaped outer rubber washer 122 bears against the outer end of the packing 120 and a pair of disk shaped leather washers 123 are disposed in an outer cap or plug 124. The inner one of the washers 123 bears against the rubber washer 122. A rubber outer washer 125 is disposed in the cap or plug member 124 and bears against the outer one of the washers 123.

The gland structure disclosed in Figure 11 is provided so as to maintain the flexible member 126 clean and at the same time the graphite bushing 121 will lubricate the flexible member 126.

In the use and operation of this invention the drilling tool is mounted on the carriage 43 and with the drilling bit projecting forwardly between the guide ears 47. The post 15 is secured between the ceiling or roof and the floor of the mine and drill supporting member 24 is angularly adjusted so as to guide the drill into the wall of the mine at the desired angle. The valve structure 57 is then operated to feed the carriage 43 forwardly as the bit digs into the wall. After the carriage 43 has moved forwardly or to the left as viewed in Figure 1 so that the drill bit has formed an opening of the desired depth, carriage 43 may be retracted by adjusting the valve 57 for moving carriage 43 rearwardly or to the right as viewed in Figure 1. The tool feed means as hereinbefore described will provide a means whereby constant pressure will be maintained on the tool and the bit so that the tool will move forwardly at an even rate, the movement of the tool depending on the physical character of the strata which is being drilled by the drill

bit. The tool supporting means hereinbefore described can be collapsed to occupy a relatively small space, by collapsing the support member 44 and the brace 25 as shown in dot and dash lines in Figure 1. It will be understood that the support structure may assume a horizontal position with it in collapsed form as the device herein disclosed is slightly longer when in collapsed form than the distance between the floor and roof or ceiling of the opening or mine.

What is claimed is:

1. A supporting means for a drilling tool comprising an elongated guide means, means supporting said guide means at a predetermined angular position relative to the vertical, a carriage slidable on said guide means, a cylinder carried by said guide means, a piston slidable in said cylinder, a reel shaft at each end of said cylinder, a first pair of reels on one of said shafts, one of said first pair of reels being positioned adjacent one end of said piston, the other of said first pair of reels being positioned adjacent one end of said carriage, a first pair of flexible members, one of said first pair of flexible members having one of its ends connected with said one end of said piston and its other end trained about said reel confronting said one end of said piston, the other of said first pair of flexible members having one of its ends secured to said one end of said carriage and its other end trained about said pulley adjacent thereto, a second pair of reels on the other of said shafts, one of said second pair of reels being positioned adjacent the other end of said piston, the other of said second pair of reels being positioned adjacent the other end of said carriage, a second pair of flexible members, one of said second pair of flexible members having one of its ends secured to the other end of said piston and its other end trained about said pulley adjacent said other end of said piston, the other of said second pair of flexible members having one of its ends connected with the other end of said carriage and its other end trained about said pulley adjacent said other end of said carriage, whereby movement of said piston in either direction effects movement of said carriage in a corresponding direction, and means connecting said cylinder with a source of pressure supply.

2. A supporting means for a drilling tool comprising an elongated guide means, means supporting said guide means at a predetermined angular position relative to the vertical, a carriage slidable on said guide means and having a pair of opposed ends, a cylinder carried by said guide means, a piston slidably mounted in said cylinder and having a pair of opposed ends, a shaft journalled for rotation in each end of said cylinder, a reel for each of said shafts, said reels being positioned within said cylinder, a flexible member for each of said reels, said flexible members having one of their ends trained about their respective reels and the other ends of said flexible members connected with that end of said piston adjacent each of said reels, a second reel mounted on each of said shafts, said second reels being carried on said shafts externally of said cylinder, a flexible member for each of said second reels, each of said last named members having one of their ends trained around their respective reel, the other ends of said last named flexible members being connected, respectively, to opposite ends of said carriage, whereby movement of said piston in either direction effects a corresponding movement in the same direction of said carriage, and means connecting said cylinder with a source of pressure supply.

References Cited in the file of this patent

UNITED STATES PATENTS

1,524,711	Hodson	Feb. 3, 1925
1,834,701	Gustafson	Dec. 1, 1931
2,586,924	Dosmond	Feb. 26, 1952