

Feb. 9, 1932.

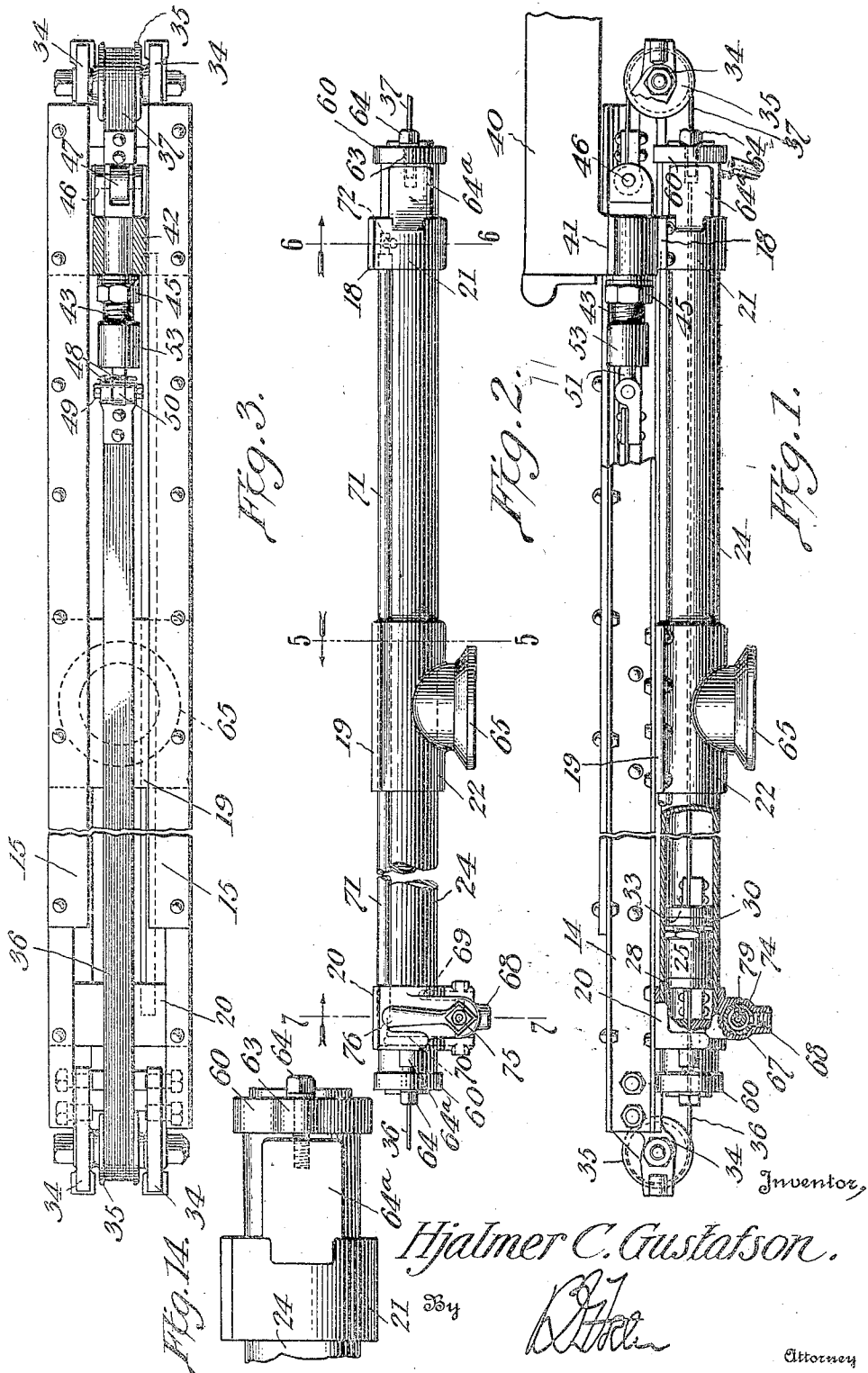
H. C. GUSTAFSON

1,844,157

TOOL FEEDING APPARATUS

Filed May 31, 1928

4 Sheets-Sheet 1



Feb. 9, 1932.

H. C. GUSTAFSON

1,844,157

TOOL FEEDING APPARATUS

Filed May 31, 1928

4 Sheets-Sheet 2

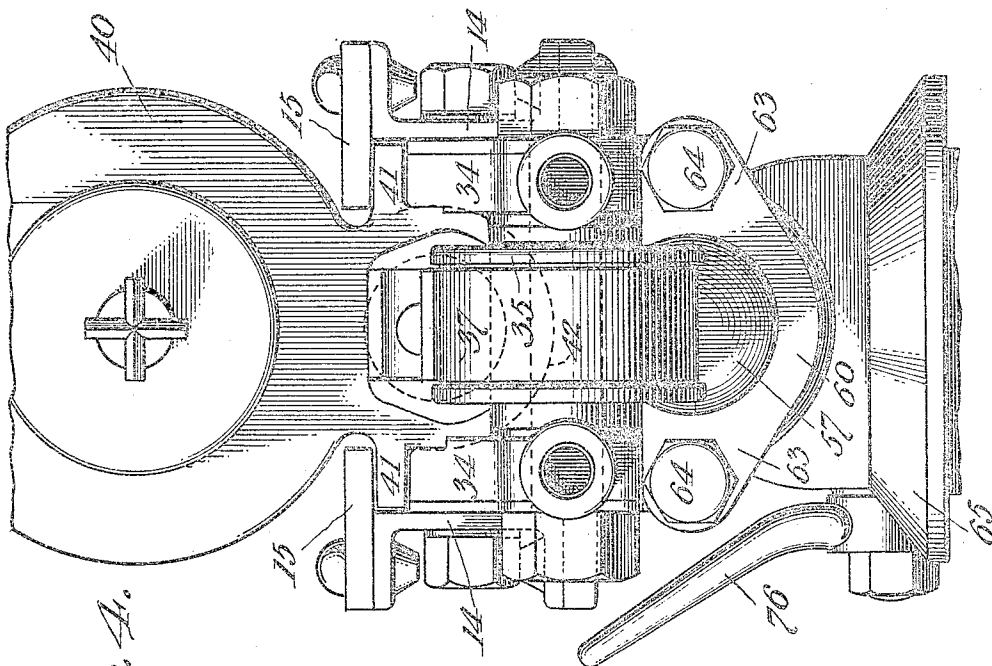


Fig. 4.

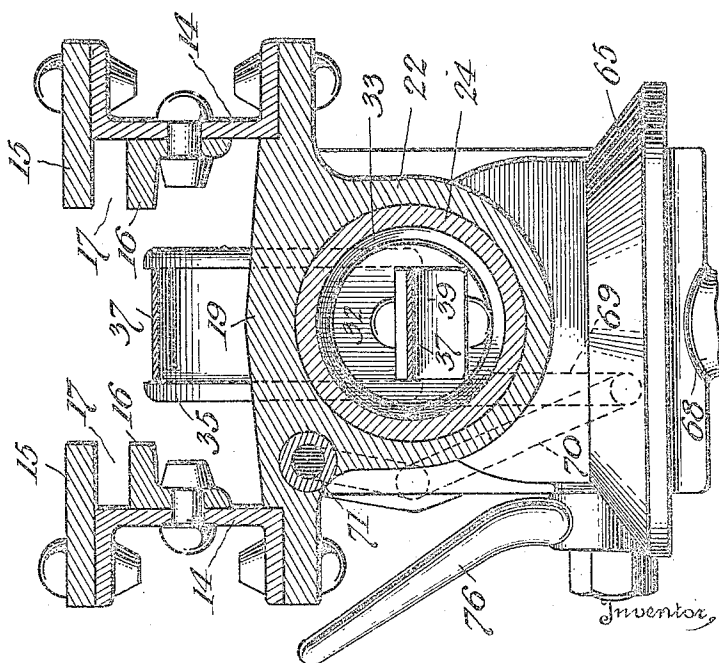


Fig. 5.

Hjalmer C. Gustafson.

By

[Signature]

Attorney

Feb. 9, 1932.

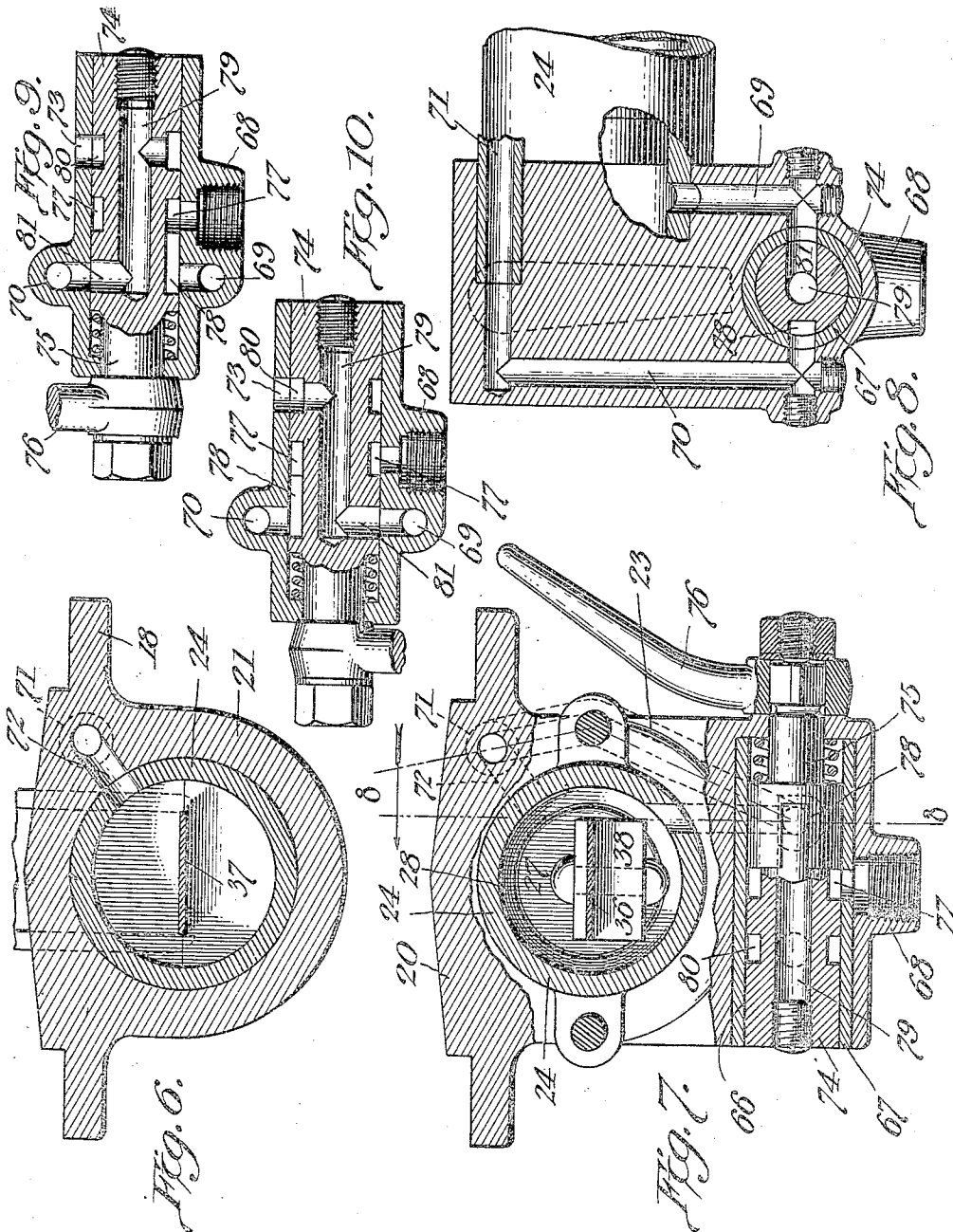
H. C. GUSTAFSON

1,844,157

TOOL FEEDING APPARATUS

Filed May 31, 1928

4 Sheets-Sheet 3



Inventor,
Hjalmer C. Gustafson.

By

[Signature]

Attorney

Feb. 9, 1932.

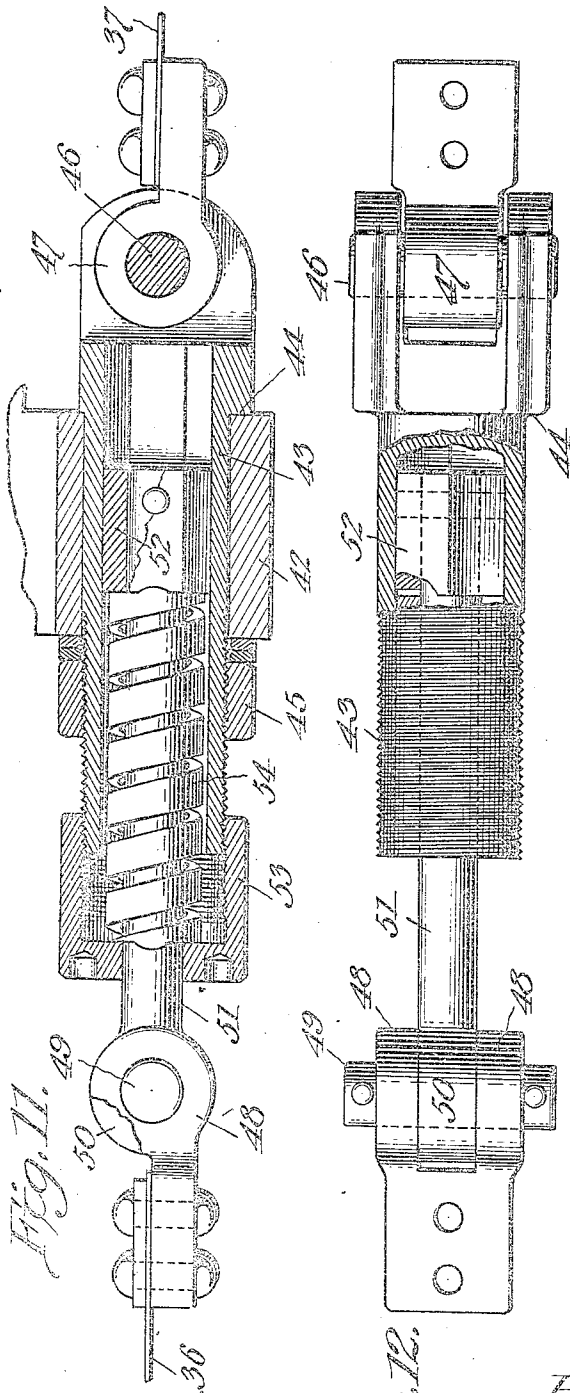
H. C. GUSTAFSON .

1,844,157

TOOL FEEDING APPARATUS

Filed May 31, 1928

4 Sheets-Sheet 4



Hjalmer C. Gustafson,
 Secy 1887

Calvin

Attorney

UNITED STATES PATENT OFFICE

HJALMER C. GUSTAFSON, OF DENVER, COLORADO, ASSIGNOR TO GARDNER-DENVER COMPANY, OF DENVER, COLORADO, A CORPORATION OF DELAWARE

TOOL FEEDING APPARATUS

Application filed May 31, 1928. Serial No. 281,914.

The present invention relates to feeding means for rock drills and similar tools, the object being to provide a structure which tends to simplicity, compactness and general practicability.

In the accompanying drawings:

Figure 1 is a side elevation of the apparatus, parts being in section.

Figure 2 is a similar view of the feeding motor detached from the guide frame.

Figure 3 is a top plan view.

Figure 4 is a rear elevation on an enlarged scale and showing the drill in place.

Figures 5 and 6 and 7 are cross sections respectively on the lines 5—5, 6—6 and 7—7 of Figure 2.

Figure 8 is a sectional view on the line 8—8 of Figure 7.

Figures 9 and 10 are detail sectional views through the valve mechanism, showing the valve in different positions.

Figure 11 is a longitudinal sectional view of the mounting for connecting the draft strap to the drill.

Figure 12 is a plan view of the same.

Figure 13 is a detail sectional view through a portion of the feed cylinder and feed piston.

Figure 14 is a detail view of one end of the feed cylinder and its mounting.

In the embodiment disclosed, a supporting frame is employed, preferably made up of a plurality of structural units. As shown, this frame consists of side channel bars 14, to the upper flange of which are riveted guide plates 15 that extend inwardly beyond the channel bars and cooperate with angle bars 16 riveted to the inner sides of the webs of the channel bars 14. The plates 15 and angle bars 16 thus form between them guideways 17. The channel bars in turn are riveted to transverse bridge pieces, to wit, a front bridge piece 18, a central bridge piece 19, and a rear bridge piece 20. The front bridge piece 18 is provided with a depending collar 21 (see Fig. 6). The central bridge piece 19 is provided with a depending collar 22 (see Fig. 5). The rear bridge piece 20 is provided with a depending collar 23 (see Figure 7), these collars being in alinement.

In said collars is secured a feed cylinder 24 that is thus located longitudinally of the frame and below the guideways 17. In said cylinder is a reciprocatory piston shown in detail in Figure 13. It comprises a body 25, into the rear end of which is threaded a plug 26 having a head 27. This head clamps against the body, a rearwardly faced packing cup 28. Into the other end of the head 25 is adjustably threaded the shank 29 of a head 30, and threaded into said head and shank is the shank 31 of a head 32 that clamps a forwardly facing packing cup 33.

Fixed to the ends of the frame bars 14 are brackets 34, in which are journaled flanged pulleys 35, and around these pulleys pass flexible draft straps 36 and 37 that are preferably of suitable sheet metal. These draft straps extend into the opposite ends of the cylinder 24 and have their ends riveted respectively to extensions 38 and 39 formed on the heads 27 and 32. The straps 36 are also connected to the drill which is mounted in the guideways 17. This drill may be of any well known character and is shown generally at 40. A known type of drill may be employed, such as a drifting drill, which is ordinarily provided with flanges 41 slidable in a guide shell, these flanges as illustrated in Figure 4 operating in the guideways 17 of the present frame and said frame constituting in effect a guide shell. As is well known, such drills usually have a screw feed and are consequently provided with a depending collar 42, in which is mounted the nut engaged by the feed screw. In the present case, said collar 42 is used as a holder for the mounting that connects the draft straps 36 and 37 to the drill.

Referring particularly to Figures 11 and 12, this mounting consists of an anchor sleeve 34 fitted into the collar 42 and having a shoulder 44 abutting against one end of said collar. The other end of the sleeve is threaded to receive a holding nut 45 that abuts against the opposite end of said collar 42. This sleeve 43 is provided at its front end with spaced projecting ears, connected by a cross pin 46 that receives an eye 47 riveted to the front draft strap 37. The rear draft strap 36 has

also secured to it a pair of eyes 48 connected by a cross pin 49 that passes through an eye 50 of a plunger shank 51 having a head 52 slidable in the anchor sleeve 43. As shown and as preferably constructed the interior of said anchor sleeve is angular in cross section and the head 52 is correspondingly shaped so that the head and stem 51 cannot turn or rotate. Threaded onto the rear end of the anchor sleeve is an adjustable cap 53 against which bears the rear end of a coiled spring 54 housed within the anchor sleeve 43 and also bearing against the head 52. It will be evident therefore that the rear draft strap 36 has a yielding mounting or connection with the drill 40.

The ends of the feed cylinder 24 are closed by packing glands through which the straps 36 and 37 pass. As these glands are substantially the same at both ends of the cylinder, but one is shown, and that in Figure 13. A plug, comprising sections 55 is fitted into the end of the cylinder and abuts a shoulder 56 formed therein. An outer or compression plug comprising sections 57 also is fitted into the cylinder and between the two is placed packing material 58. The adjacent ends of the two plugs are preferably concaved as illustrated. Surrounding the outer or compression plug 57 and abutting against a shoulder 59 thereof is a holding ring 60 having a notch 61 that receives a pin 62 located in one of the plug sections 57 to prevent the turning of the plug. This ring 60 has oppositely outstanding ears 63 (see Fig. 4) through which pass cap screws 64 that engage in extensions 64a of the collars 21.

The collar 22 of the central bridge piece 19 is provided with a mounting cone 65. The collar 23 of the rear bridge piece 20 is provided with a transversely disposed valve chamber 66 having a bushing sleeve 67. A motive fluid supply nipple 68 depends from this collar 23 and opens into the valve chamber. As shown in Figures 8, 9 and 10 a combined supply and exhaust port 69 opens from one side of the valve chamber into the rear end of the cylinder 24, and another combined supply and exhaust passageway 70 opens from the opposite side of said valve chamber. This passageway 70 leads to a pipe 71 that extends longitudinally along the cylinder 24 and is in communication with the front end of the cylinder as indicated in dotted lines at 72 in Figure 2. The valve chamber furthermore is provided with an exhaust port 73.

A rotatable valve 74 is located in the valve chamber 66 and has a stem 75 projecting from the sleeve and provided with an actuating handle 76. This valve has an annular groove 77 in constant communication with the supply nipple 68 (see Figure 7) and leading from said groove is a channel 78 as shown in Figures 9 and 10, which channel is adapted to

move into communication with either passageway 69 or 70, according to the position assumed by the valve. Obviously therefore fluid under pressure supplied through the nipple 68 can be distributed to either end of the cylinder 24 and thus in advance of or behind the piston in said cylinder. The valve 74 furthermore has a central longitudinal exhaust bore 79 that opens into an annular channel 80 formed in the periphery of the valve, which channel is in constant communication with the exhaust port 73. A transverse port 81 opens from the inner end of the bore 79 to the periphery of the valve and opposite the channel 78 so that when said channel 78 is in communication with one of the passageways 69—70 the port 81 will be in communication with the other passageway (see Figures 9—10).

With this construction, it will be evident that if the drill is at the rear end of the guide shell or supporting frame, the feed piston 25 will be at the front end of the feed cylinder. If now the valve 74 is turned to admit motive fluid through the passageways 70—71, it will act upon the front end of the piston and move the same rearwardly. This causes a draft strain upon the front draft strap 37, sufficient to advance the tool as the drilling proceeds. When it is desired to move the drill rearwardly, it is only necessary to turn the valve so that the supply channel 78 is in communication with the passageway 69, whereupon motive fluid will be admitted behind the piston to move it forwardly causing draft upon the rear strap 36 and pulling the drill rearwardly.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim is:

1. In drilling apparatus, the combination with a supporting frame having a guideway for the drill, of a drill movably mounted in the guideway and having a collar portion, a motor for advancing the drill to its work as the drilling progresses and comprising a cylinder mounted on the frame, a piston in the cylinder, oppositely extending flexible connections secured to the piston, an anchor sleeve fixed in the collar portion of the drill, one of said flexible connections being secured to the anchor sleeve, and a yielding plunger in the sleeve, and having the other flexible connection secured thereto.

2. In drilling apparatus, the combination with a guide shell having collars, of a drill slidably mounted in the guide shell, a feed

cylinder mounted in the collars, a piston in the cylinder, longitudinally movable flexible connections between the ends of the piston and the drill, pulleys at the ends of the guide shell and about which the flexible connections pass, a valve chamber formed in one of the collars, passageways leading from the valve chamber to the front and rear ends of the cylinder, means for supplying motive fluid to the valve chamber, and a valve in the valve chamber controlling the supply of motive fluid to the passageways and its exhaust therefrom.

3. In drilling apparatus, the combination with a guide shell, of a central collar depending therefrom and having a mounting cone, end collars also depending from the ends of the guide shell, pulley brackets secured at the ends of the guide shell and having pulleys journaled therein, a drill slidably mounted in the guide shell and having a collar on its underside, a cylinder secured in the guide shell collars and disposed longitudinally of said shell, a piston in the cylinder, flexible bands secured to the piston, passing through the ends of the cylinder and around the pulleys, an anchor sleeve secured in the drill collar, the front band being fixed to the anchor sleeve, a yielding plunger in the anchor sleeve secured to the rear band, one of said guide shell collars having a valve chamber formed therein, passageways leading from the valve chamber to the ends of the cylinder member, and a valve in the valve chamber controlling said passageways.

In testimony whereof, I affix my signature.

HJALMER C. GUSTAFSON.

40

45

50

55

60

65