Oct. 25, 1932. I. S. CARPENTER 1,884,969

ROCK DRILL

Filed April 25, 1930 4 Sheets-Sheet 1

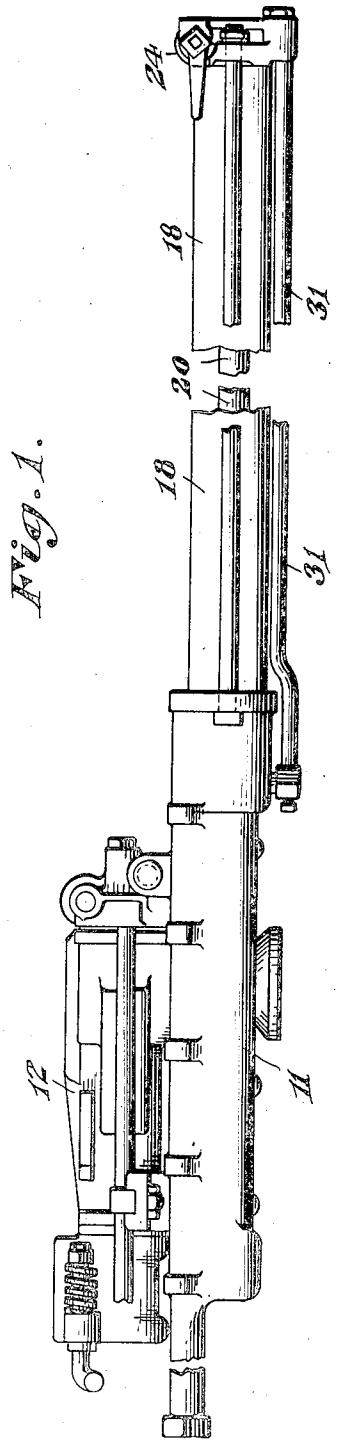


Fig. 1.

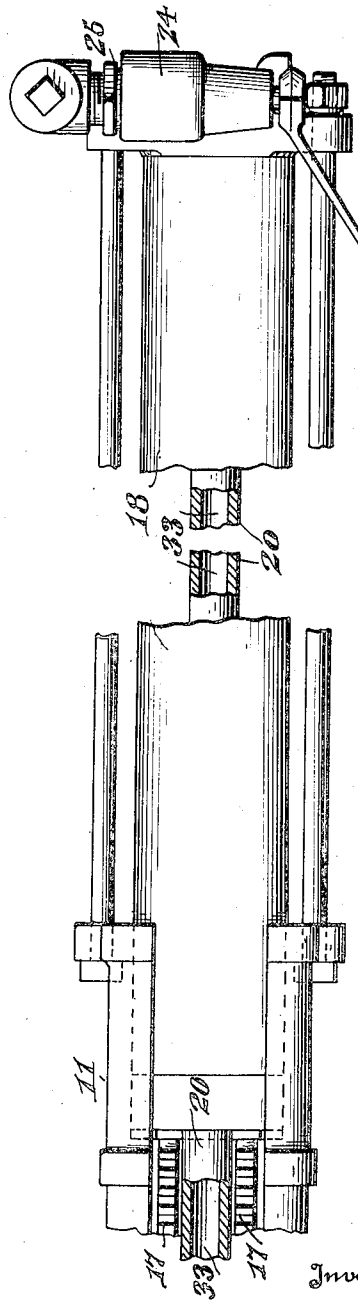


Fig. 2.

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Oct. 25, 1932. I. S. CARPENTER 1,884,969

ROCK DRILL

Filed April 25, 1930 4 Sheets-Sheet 2

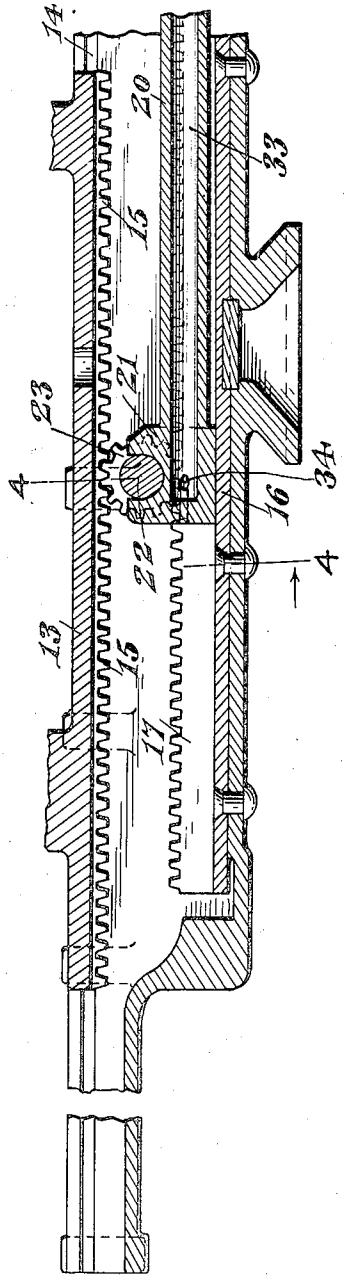


Fig. 3.

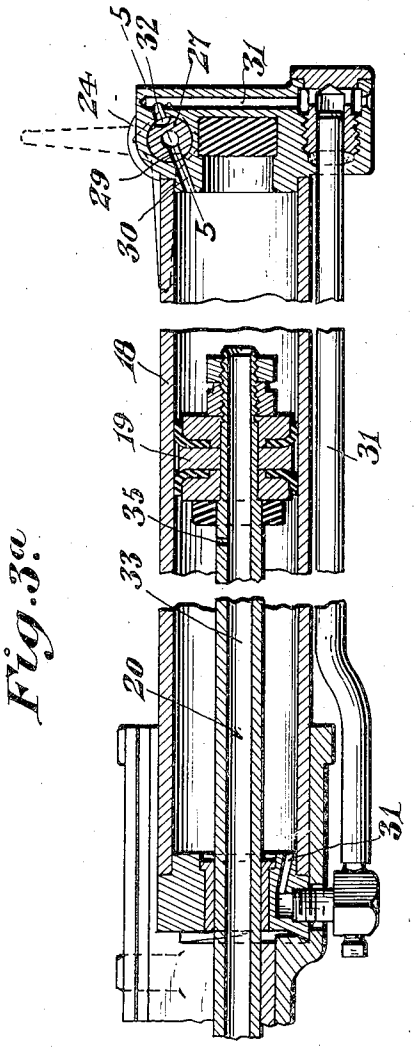


Fig. 3a.

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Oct. 25, 1932. I. S. CARPENTER 1,884,969

ROCK DRILL

Filed April 25, 1930 4 Sheets-Sheet 3

Fig. 4.

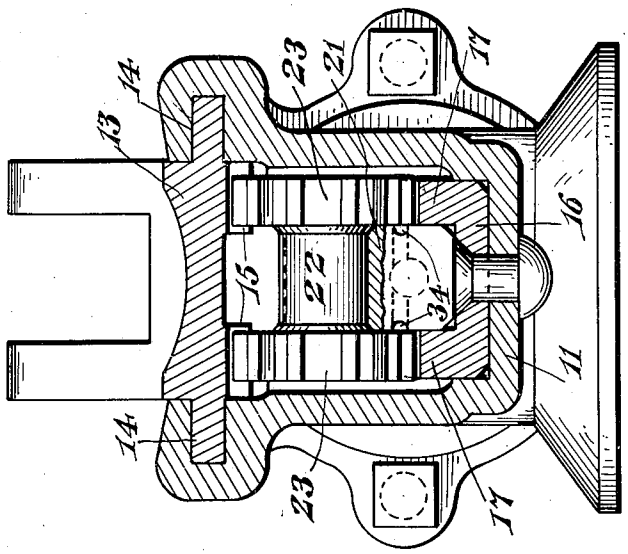


Fig. 9.

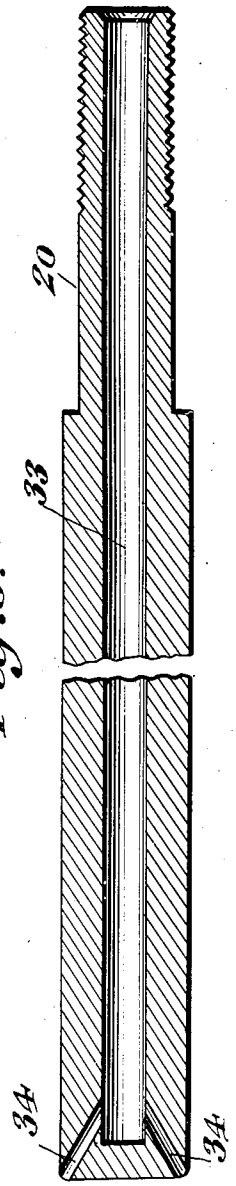


Fig. 5.

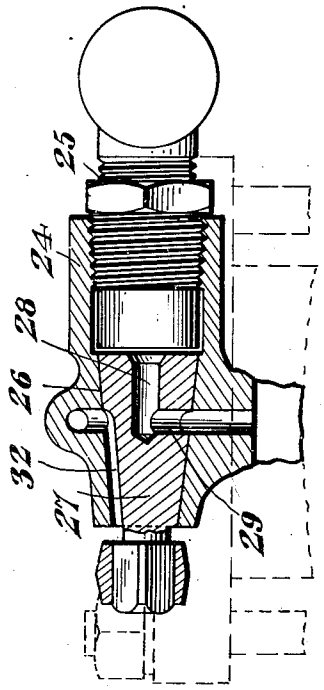
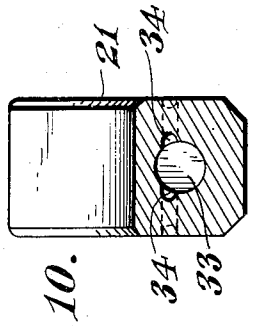


Fig. 10.



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Oct. 25, 1932. I. S. CARPENTER 1,884,969

ROCK DRILL

Filed April 25, 1930 4 Sheets-Sheet 4

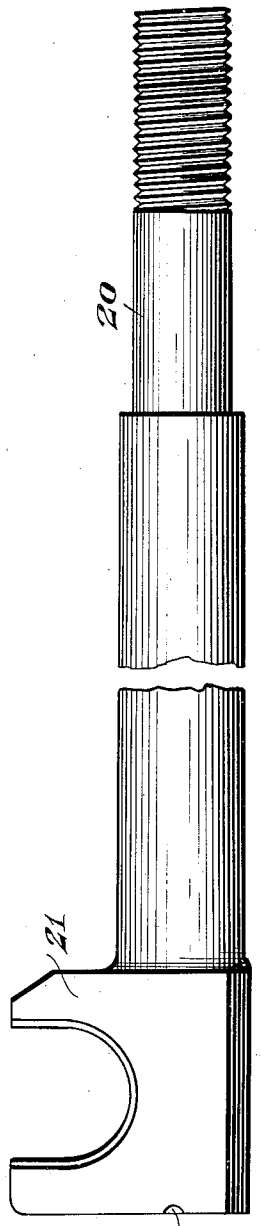


Fig. 6.

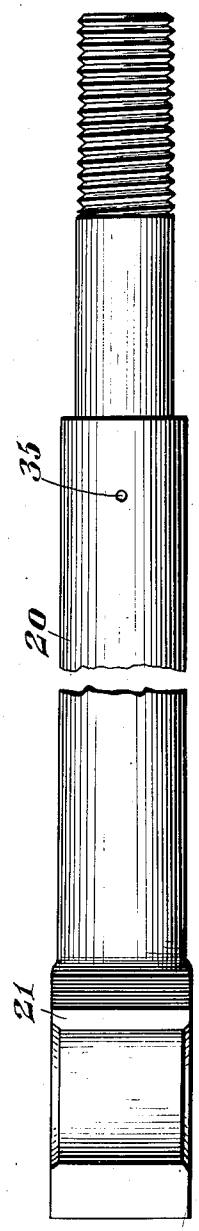


Fig. 7.

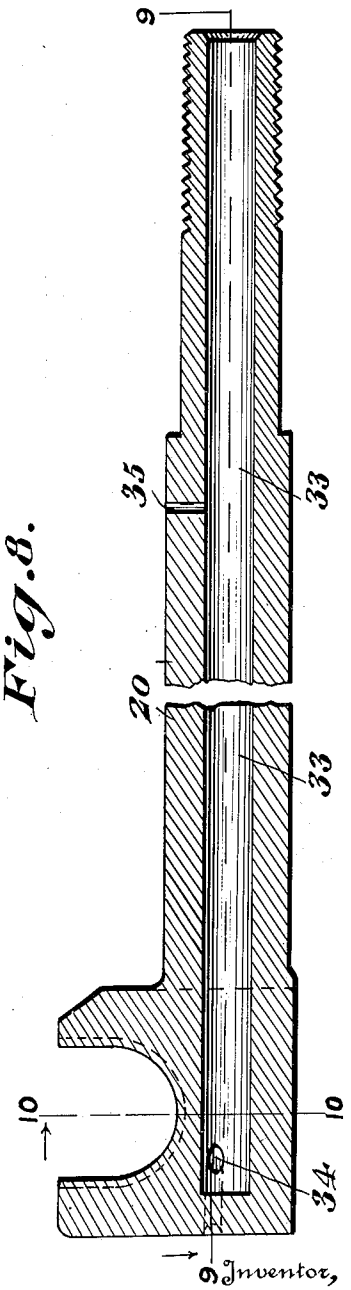


Fig. 8.

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Patented Oct. 25, 1932 1,884,969

UNITED STATES PATENT OFFICE

IVAN S. CARPENTER, OF DENVER, COLORADO, ASSIGNOR TO GARDNER-DENVER COMPANY, OF DENVER, COLORADO, A CORPORATION OF DELAWARE

ROCK DRILL

Application filed April 25, 1930. Serial No. 447,350.

In that type of rock drill in which the drill is given a greater feeding movement than the movement imparted to the feeding mechanism, it has been found that the dust and dirt from the hole being drilled clogs the mechanism and sometimes interferes with its proper operation.

The object of the present invention is to provide means for overcoming this difficulty.

In the accompanying drawings:

Figure 1 is a side elevation of the tool.

Figure 2 is a plan view of the feeding mechanism with portions broken away.

Figure 3 is a longitudinal sectional view through the drill shell and the gearing for feeding the drill.

Figure 3*a* is a similar view but of the feeding means.

Figure 4 is a cross sectional view on the line 4—4 of Figure 3.

Figure 5 is a detail sectional view through the controlling valve.

Figure 6 is a side elevation of the piston rod.

Figure 7 is a plan view of the same.

Figure 8 is a longitudinal sectional view therethrough.

Figure 9 is a sectional view on the line 9—9 of Figure 8.

Figure 10 is a cross sectional view on the line 10—10 of Figure 9.

In the embodiment disclosed, a guide shell 11 has the drill 12 slidably mounted thereon, said drill being supported by a carriage 13 movably mounted in guideways 14 in the shell 11 (See Figures 3 and 4). The underside of the carriage is provided with longitudinal racks 15. The bottom of the shell has a channeled member 16 secured therein, the upstanding flanges of said channeled member being in the form of racks 17 underlying the racks 15.

Secured to the rear end of the guide shell 11 is a cylinder 18 that extends longitudinally of said guide shell and has a reciprocatory piston 19 located therein. This piston is attached to a piston rod 20 projecting through the front head of the cylinder 18 and terminating in a head or stirrup 21 that slides in the channel of the member 16 (see Figures 3 and 4). Rotatably mounted in the head or stirrup 21 is a transverse shaft 22 having at its ends pinions 23 located on opposite sides of the head 21 and meshing with the racks 15 and 17. Obviously as the piston is moved forwardly, the pinion 23 will be rotated and will cause the racks 15 and consequently the carriage 13 to have a movement double the movement of the piston.

For the purpose of supplying motive fluid to the cylinder 18 to actuate the piston 19, a nipple 24 is formed at the rear end of the cylinder to receive a coupling 25 from a supply hose line or other suitable conduit. In this nipple is formed a valve chamber 26 having a rotary throttle valve 27 extending longitudinally of the valve chamber, and opening through its inner end is a supply passageway 28 in communication with a transverse port 29. This port can be brought into communication with a short passageway 30 opening into the rear end of the cylinder or with a longer conduit 31 leading to the front end of the cylinder. An exhaust channel 32 formed in the periphery of the valve 27 can also alternately be brought into communication with the passageway 30 or conduit 31 to permit the exhaust of motive fluid from either end of the cylinder.

With this construction, when the valve 27 is turned to one position, as for example, that shown in Figure 3*a*, motive fluid will be admitted to the rear end of the cylinder, thereby forcing the piston forwardly while the fluid in advance of the piston will exhaust through the conduit 31 and channel 32 to atmosphere. On the other hand if the valve is turned so that the port 29 is brought into communication with the conduit 31, then the motive fluid will be admitted to the front end of the cylinder, forcing the cylinder rearwardly, while the fluid behind the piston will exhaust through the passageway 30 and channel 32 which is now in alinement with said passageway 30.

In order to prevent the accumulation of detritus on the racks and particularly the lower racks 17, the piston rod 20 is provided with a longitudinal passageway 33 opening into the rear portion of the piston chamber

behind the piston. This passageway 33 extends into the head 21 and divergent ports 34 open through the opposite corners of the head. Consequently a portion of the motive fluid admitted will be directed against the lower racks. A small port, as 35, may also afford communication between the front portion of the cylinder and the passageway 33, so that the fluid will escape therethrough and thence through the delivery ports 34 when the motive fluid is operating against the front end of the piston. It will of course be understood that the port 35 is less than the cross sectional area of the conduit 31 so that sufficient fluid under pressure will be in the cylinder to operate the piston, and this is true also with respect to the areas of the ports 34 as compared to the area of the supply passageway 30.

With this structure therefore a means is provided for keeping the gearing relatively free from accumulations of dirt that tend to clog and prevent the proper operation of the mechanism.

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. The combination with a supporting shell having spaced guides on its side walls, of a drill slidable on the guides and having a rack extending longitudinally of the guides and in the shell, a reversely disposed rack in the bottom of the shell, an actuating member movable longitudinally of the shell, a pinion journaled on the actuating member and meshing with the racks, a cylinder fixed to the rear end of the shell, a piston operating in the cylinder and having a piston rod connected to the actuating member, and a fluid passageway extending through the piston rod and opening through the actuating member to deliver fluid under pressure against the racks.

2. The combination with a support, of a drill slidable thereon and having a rack, a rack on the support, a pinion engaging both the racks, and movable along the support, a fluid operated motor mounted on the support, and a connecting member between the motor and pinion for moving the drill and having a fluid passageway therein for directing fluid from the motor to the racks to clean detritus therefrom in advance of the pinion.

3. The combination with a percussive tool, of a fluid operated motor for advancing the tool to its work, mechanism interposed between the motor and the tool and movable with respect thereto for causing the movement of the tool, and said mechanism including a rod having therein a passageway for directing fluid from the motor to a point in advance of the mechanism to clean detritus from its path.

4. The combination with a drill support having a guideway, of a drill slidable on the guideway, a feed motor for the drill comprising a cylinder member and a piston member therein, one of said members being fixed to the support, the other being movable with respect thereto, mechanism operated by the movable member for transmitting motion to the drill, and said mechanism including a rod having therein a passageway for directing fluid from the cylinder to a point in advance of the mechanism to clear detritus from its path.

5. The combination with a drill support having a guideway, of a drill slidable on the guideway, a feed motor for the drill comprising a cylinder member fixed to the support, a piston movable within the cylinder and having a rod, mechanism carried by the rod and engagable with a track for transmitting motion to the drill, and a fluid passageway extending through the piston rod and opening through the mechanism to deliver fluid under pressure upon the track in advance of the movement of the mechanism.

6. The combination with a support of a drill slidable thereon and having a rack, a rack on the support, a pinion engaging both racks and movable along the support, a fluid operated motor mounted on the support, a connecting member between the motor and pinion, and said member having a fluid passageway therein for directing fluid from the motor to a point in advance of the pinion to clear detritus from the racks.

In testimony whereof, I affix my signature.

IVAN S. CARPENTER.