M. HARDSOCG.

AIR FEED FOR DRILLS.

APPLICATION FILED AUG. 5, 1909.

966,911.

Patented Aug. 9, 1910

2 SHEETS—SHEET 1.

Fig. 1.

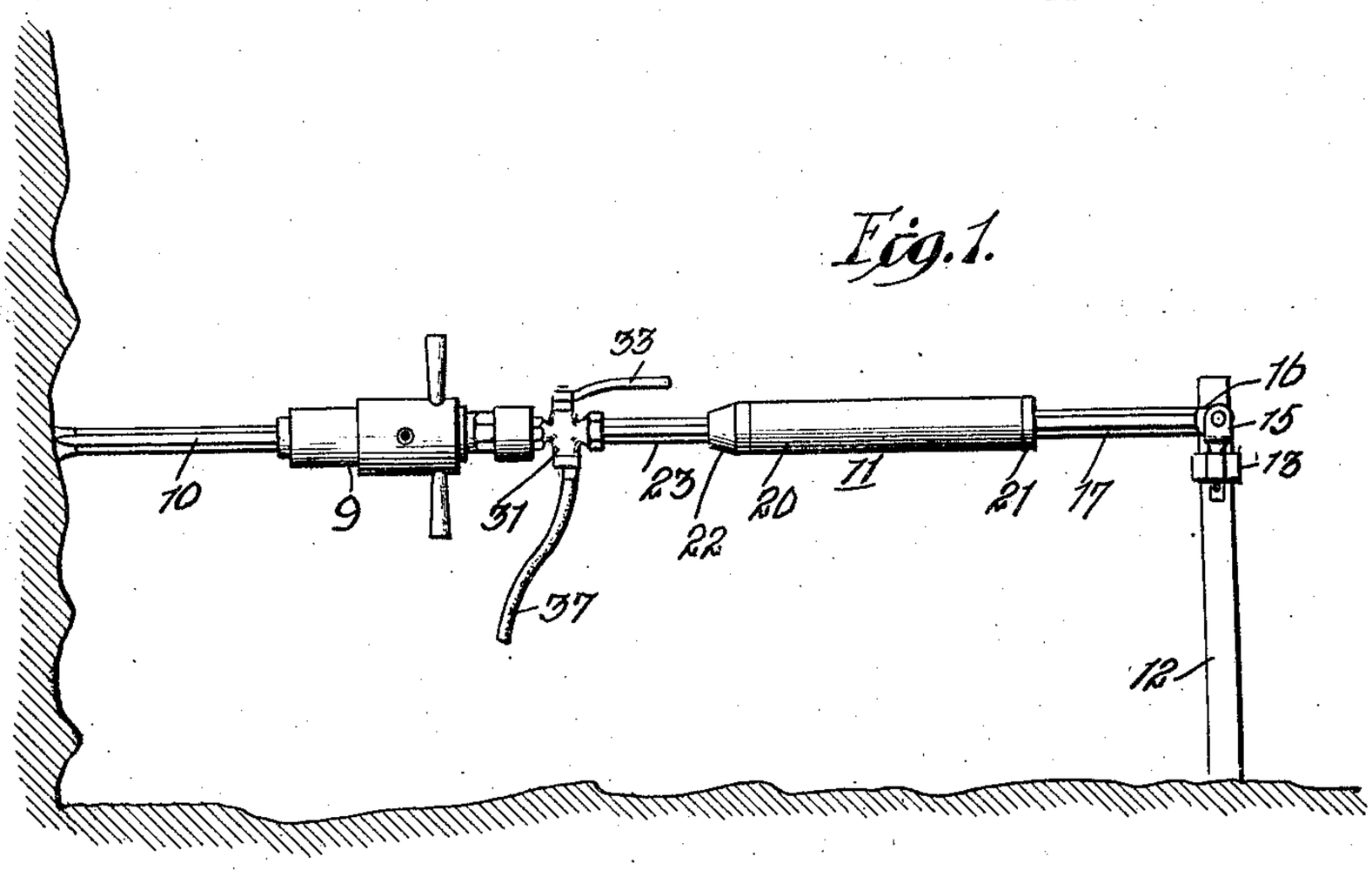


Fig. 2.

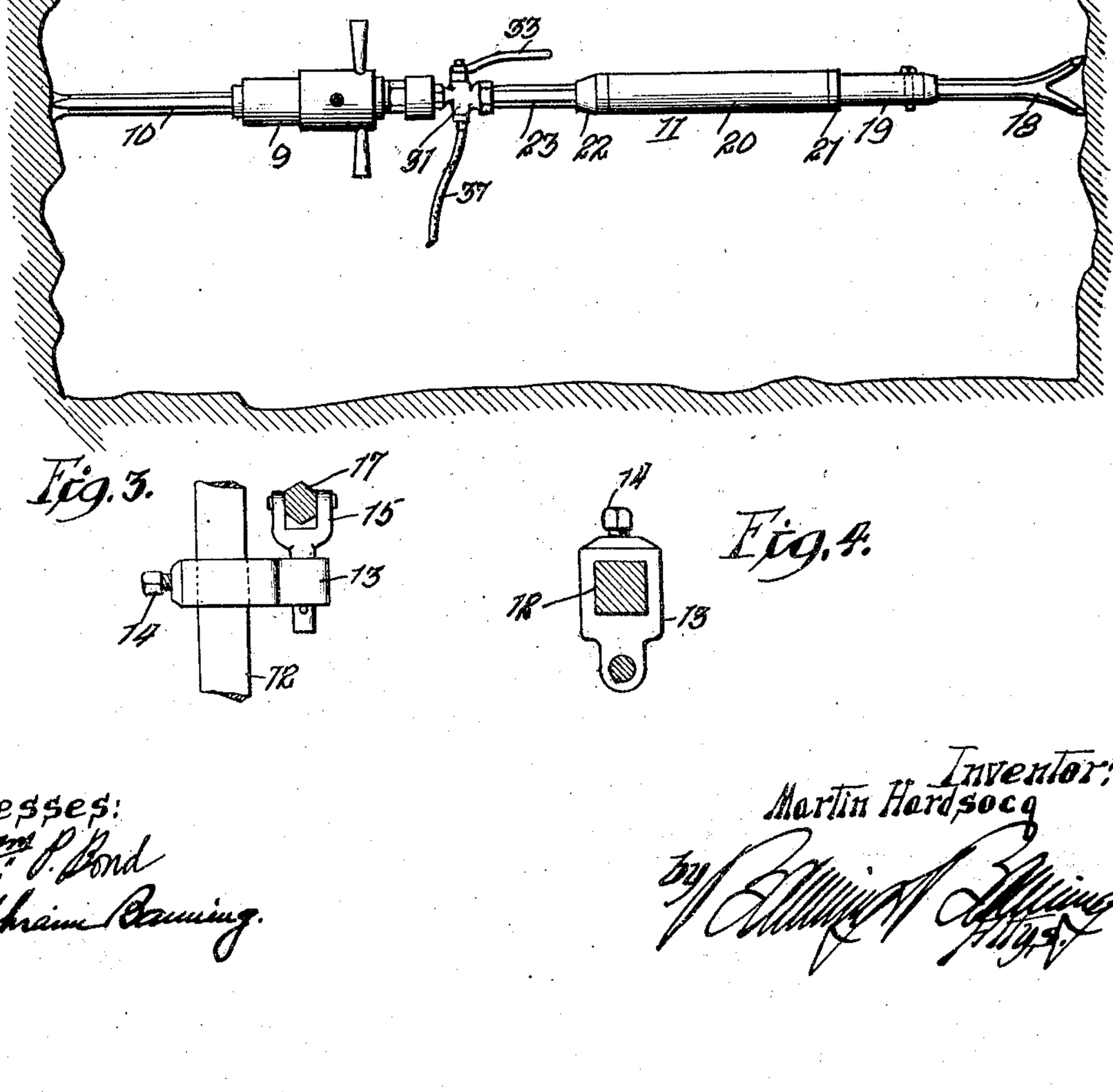
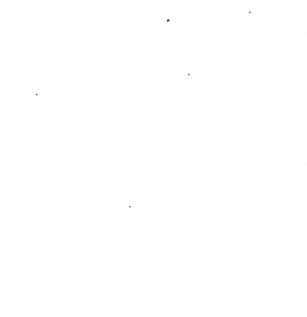


Fig. 3.

Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

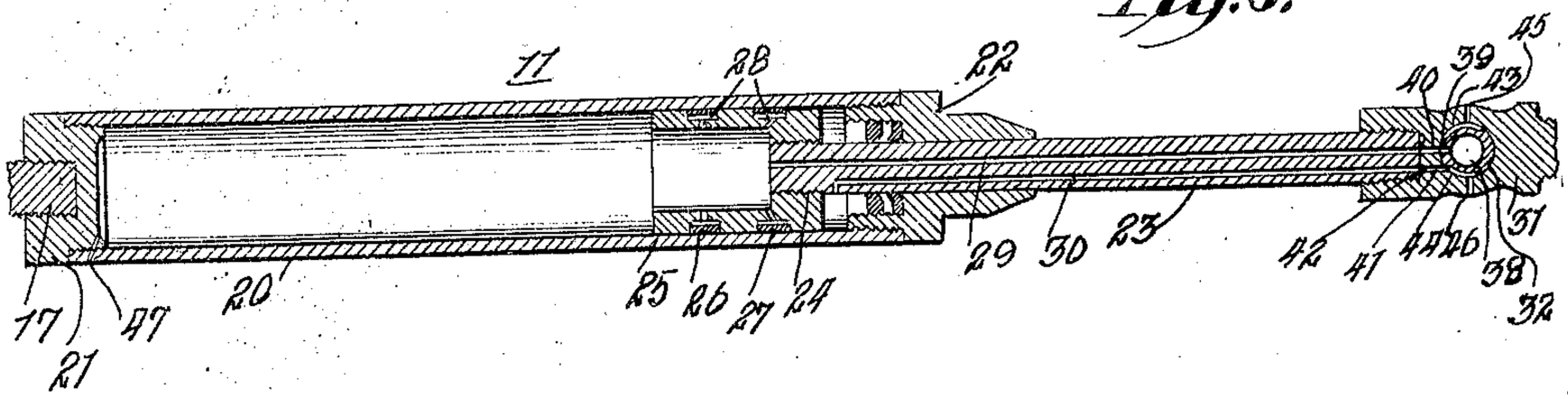


Fig. 6.

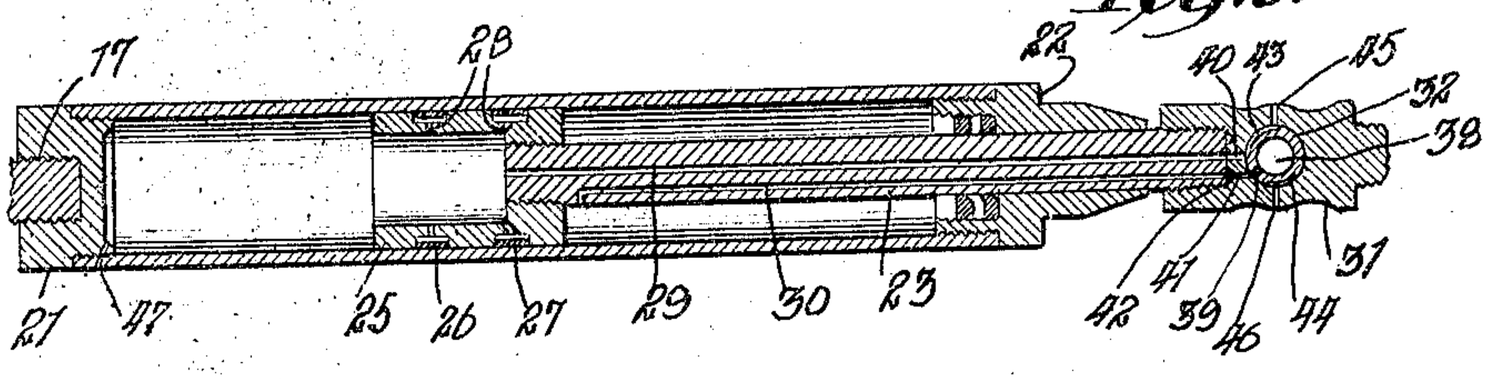


Fig. 7.

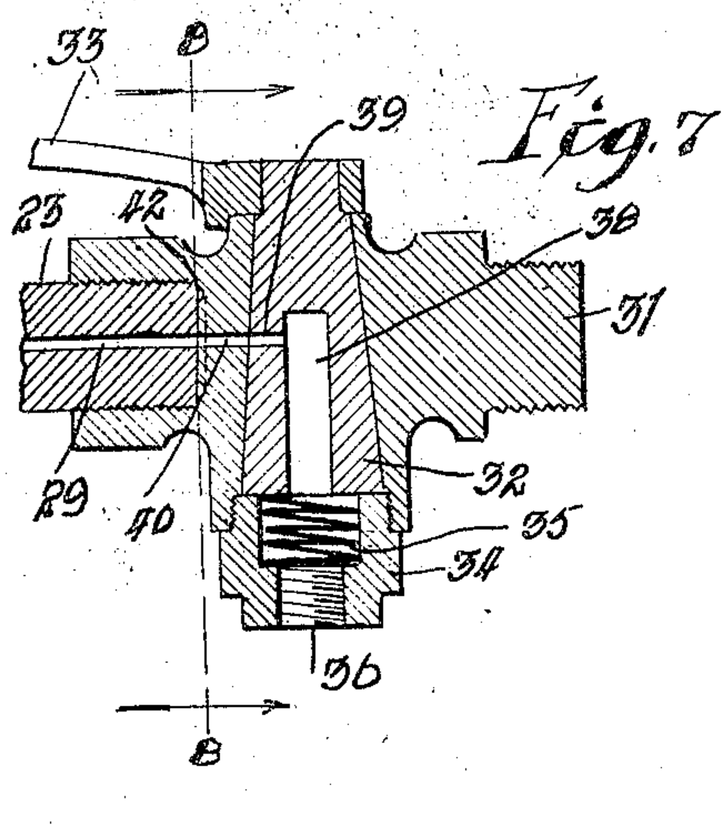
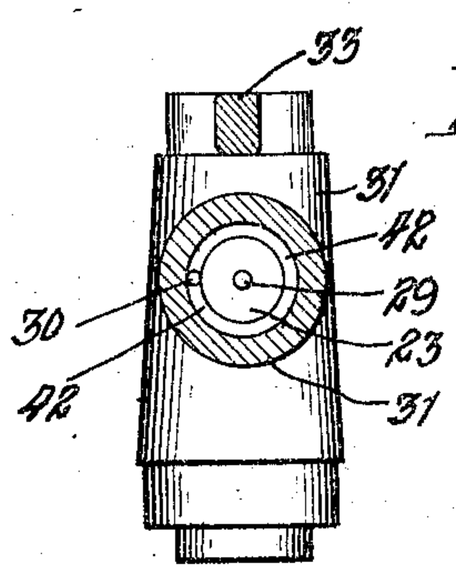


Fig. 8.



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UNITED STATES PATENT OFFICE.

MARTIN HARDSOCG, OF OTTUMWA, IOWA.

AIR-FEED FOR DRILLS.

966,911. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed August 5, 1909. Serial No. 511,422.

To all whom it may concern:

Be it known that I, MARTIN HARDSOCG, a citizen of the United States, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Air-Feeds for Drills, of which the following is a specification.

This invention relates to an air feed for rock drills of the ordinary type; and has for its object to construct a feed which will not only advance the drill forward, but will pull the cutting tool out of the hole after the drilling is completed. In the ordinary type of drill, the tool is pulled out by hand. This is impossible in a great many cases, because the tool has become too tightly wedged in the rock; and in order to pull it out it is necessary to fire a blast and shatter the rock, which usually results in injury to the tool.

In the drawings, Figure 1 is a side elevation of a drill in operative position, mounted for use in an open quarry; Fig. 2 a side elevation of a drill in operative position, mounted for use in tunnel work; Fig. 3 a front view of the mounting post and arm for carrying the drill; Fig. 4 a cross section of Fig. 3; Fig. 5 a sectional elevation of the feeding device, showing the piston advanced; Fig. 6 a similar view to Fig. 5, showing the piston withdrawn; Fig. 7 a cross section of the valve for controlling the air feed; and Fig. 8 a view taken on line 8—8 of Fig. 7, looking in the direction of the arrow.

Referring to Figs. 1 and 2, the device, as shown, consists of a pneumatic hammer 9, to which is attached a bit 10—the hammer and bit being of ordinary and well known type do not need any detailed description. Attached to the rear of the hammer is an air feed 11, as shown in Fig. 1. Where the drill is being used in open quarry work the device is attached to a post 12 which is embedded in the rock; and slidably mounted upon the post is an arm or bracket 13 which is locked in position by means of a set screw 14. In the portion of the arm extending out from the post is mounted a bracket 15, between the ears of which the end 16 of a hexagonal bar 17 is pivotally secured. This construction, it will be seen, enables the drill to be moved to any point desired. I do not desire to limit myself, however, to any particular manner of mounting. In Fig. 2 of the drawings, the drill is shown mounted for use in tunnel work. In this instance, in place of the post 12 a forked bar 18 is used, which is mounted within a sleeve 19.

The air feeding device consists of a piston chamber 20, screw-threaded into the rear end of which is a plug 21 which receives the screw-threaded end of the bar 17. The forward end of the cylinder also has screw-threaded thereinto a plug 22 which is bored to receive a hexagonal bar 23 having a screw-threaded end 24 which is entered into a piston head 25. Surrounding the piston head are packing rings 26 and 27, which are held outwardly in engagement with the side of the casing by air pressure, which enters through ports 28 formed in the side walls of the piston head.

The hexagonal bar 23 is provided with two longitudinal passages 29 and 30, the former of which extends through the center of the bar and is used for supplying air to feed the piston forward. As the air comes through the passage 29, it fills the space between the rear end of the piston chamber and the rear face of the piston head, moving the piston forward and feeding the drill. When the air is supplied to the passage 30, it enters between the front end of the piston chamber and the front face of the piston, moving the piston rearwardly and withdrawing the drill from the hole.

Attached to the forward end of the hexagonal bar 23 is a valve casing 31 which contains a tapered valve member 32, the valve member having a squared head upon its upper end, to which is attached a handle 33; the valve member being held in place by means of a plug 34 screw-threaded into the bottom of the casing. A spring 35 is located within a chamber formed in the plug 34 and bears against the under face of the valve member 32, holding the same in tight engagement with the casing and preventing undue leakage. The plug 34 is formed with a passage 36, into which is secured a coupling attached to the main supply pipe 37. The passage 36 is also in communication with a port or chamber 38 formed in the valve member, which chamber has leading therefrom a passage 39 which is adapted to register, when the valve member is turned into various positions, with either one or the other of the passages 40 and 41 formed in the valve casing. The passage 40 communicates with the passage

29 formed in the center of the bar 23, and the passage 41 communicates with a groove 42 formed in the valve casing at the point where the bar 23 terminates, the groove 42 also being in communication with the passage 30 in the bar 23. The function of the groove is to bring the passage 30 into communication with the passage 41, no matter where the terminus of the passage 30 may be when the device is assembled. The passage 29 being in the center of the bar will, of course, always come into communication with the passage 40.

On the exterior of the valve member 38 are formed two grooves 43 and 44, the former of which brings the passage 40 into communication with an exhaust passage 45 formed in the valve casing, and the latter of which brings the passage 41 into communication with an exhaust passage 46 formed in the casing, these two grooves, of course, acting alternately as the valve is turned from one position to another. Located at the rear of the piston chamber is a vent passage 47 which allows the air to be exhausted from the piston chamber as the piston is moved forward and causes the piston to advance at a slow rate of speed. By allowing a small or large quantity of air to be admitted into the piston chamber for feeding the piston forward, the rate of feed can be varied according to the condition and strength of the rock being bored.

The operation will be understood from the foregoing, but briefly is as follows: Referring to Fig. 5, which shows the piston in its most advanced position, the passage 29 is in communication with the passage 40, which in turn is in communication with the passage 39 located in the valve member, permitting air to flow from the valve into the piston chamber and act upon the rear face of the piston. When the valve is in this position, the passage 30 will be in communication with the groove 44, and the air from in front of the piston will be exhausting through the passage 46 of the valve casing. Referring to Fig. 6, the valve has been turned to bring the passage 39 into communication with the passage 30, and is supplying air to act upon the front face of the piston while the air from the rear face of the piston is being exhausted through the passage 29 which is now in communication with the groove 43, which groove is in communication with the exhaust passage 45 formed in the casing. It will thus be seen that as the handle controlling the valve is turned, the piston will be actuated forward and back within the piston chamber, advancing and retracting the drill, although the retraction of the drill is much more rapid than the advancement.

I claim:

1. In an air feed for rock drills, the combination of a piston chamber, a piston actuated forward and back within the chamber, a rotatable tapered valve member for controlling a medium under pressure, said valve member being provided with a chamber and with a passage communicating with said chamber, a valve casing, a bar connected to the valve casing and to the piston head, said bar having a passage extending through its center and a passage extending at one side thereof, the valve casing having formed therein a circular groove communicating with the latter passage and also having a passage communicating with the central passage in the bar and a passage communicating with the circular groove, and a connection between the valve casing and the rock drill, substantially as described.

2. In an air feed for rock drills, the combination of a piston chamber, a piston actuated forward and back within the chamber, a rotatable valve member for controlling a medium under pressure, said valve member having a chamber formed therein, communicating with a main supply pipe, and also having a passage communicating with the chamber, a valve casing, a bar secured to the valve casing and to the piston head, said bar having longitudinally extending passages formed therein terminating on opposite sides of the piston head, the valve casing having passages formed therein extending in alinement and communicating with the passages in the bar, each of which is adapted to communicate with the passage in the valve member when the valve is turned into proper position to establish such communication, and a connection between the valve casing and the rock drill, substantially as described.

3. In an air feed for rock drills, the combination of a piston chamber, a piston actuated forward and back within the chamber, a rotatable valve member for controlling a medium under pressure, said valve member having a chamber formed therein communicating with a main supply pipe, and also having a passage communicating with the chamber, a valve casing, a bar secured to the valve casing and to the piston head, said bar having a central longitudinally extending passage formed therein and a passage extending parallel therewith and at one side thereof, the passages terminating on opposite sides of the piston head, the valve casing having a circular groove communicating with the passage extending at one side of the bar, and also having a passage communicating with the central passage in the bar, and a passage communicating with the circular groove, the passage in the valve member being adapted to be brought into communication with either one of the passages in the valve casing, the valve casing having oppositely disposed exhaust passages, and

the valve member having circumferential grooves so positioned that when the passage in the valve member is brought into communication with one of the passages in the valve casing one of the circumferential grooves in the valve member will be in position to establish communication between the other passage in the valve casing and one of the exhaust passages, and a connection between the valve casing and the rock drill, substantially as described.

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