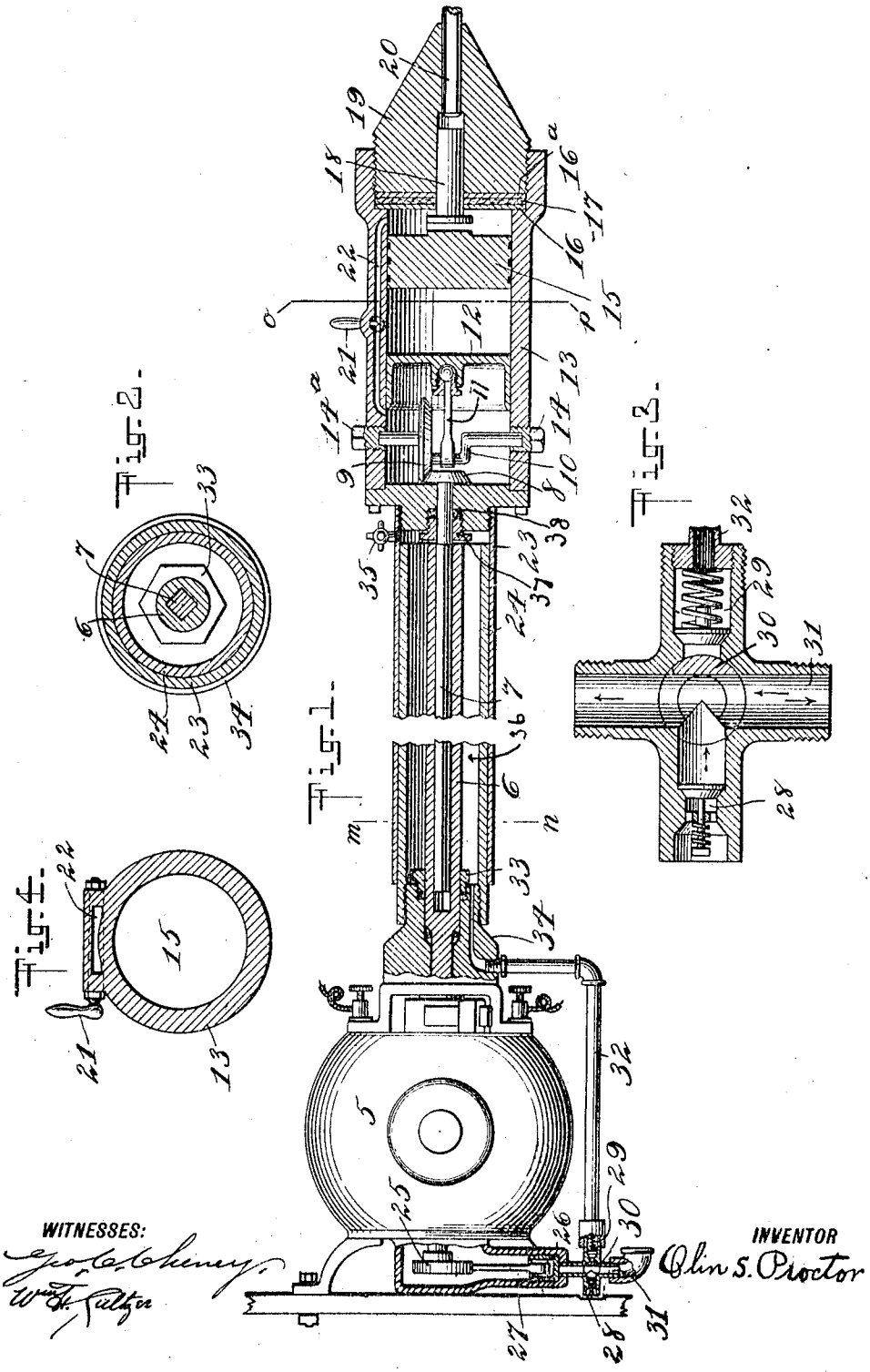
O. S. PROCTOR.

ELECTRIC ROCK DRILL.

APPLICATION FILED MAR. 2, 1908.

955,899. Patented Apr. 26, 1910.



UNITED STATES PATENT OFFICE.

OLIN S. PROCTOR, OF DENVER, COLORADO.

ELECTRIC ROCK-DRILL.

955,899. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed March 2, 1908. Serial No. 418,779.

To all whom it may concern:

Be it known that I, OLIN S. PROCTOR, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Electric Rock-Drill, of which the following is a specification.

My invention relates to improvements in rock drills.

The objects of the invention are: First, to provide a simple, durable and light electric driven rock drill particularly adapted to stoping but may be used in other work. Second, to provide an electric driven rock drill comprising an electric motor which is provided with an extensible shaft which projects into an air pulsating cylinder. Means contained in said cylinder for converting the rotary motion of the shaft into reciprocating motion which causes the air contained in said cylinder to impart an elastic reciprocating motion to the hammer piston. Third, to provide an extensible air cylinder between the motor and drill for the purposes of supporting the drill while working and to prevent the vibration of the drill injuring the motor; and means to supply air to said cylinder. These objects are accomplished by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a longitudinal sectional view of the assembled machine. Fig. 2, is a cross section on line M N, Fig. 1. Fig. 3, is an enlarged sectional view of air pump valves. Fig. 4, is a cross section on line O P, Fig. 1.

Similar characters of reference refer to similar parts throughout the several views.

Referring to the accompanying drawings: The numeral 5 designates an electric motor of which the armature shaft 6 is made hollow to receive the square or hexagonal solid shaft 7 which projects through the end of the cylinder 13 and is provided with a bevel gear 8 in engagement with the bevel gear 9 on the crank shaft 10 mounted in bearings 14 and 14ª threaded in the walls of the cylinder 13. By means of the crank shaft 10 and the connecting rod 11 the trunk piston 12 is reciprocated in the cylinder 13. The hammer piston 15 is free to move in the cylinder 13 and its operation will be explained hereafter. The forward end of the cylinder 13 is closed by the striking pin 18 which is surrounded by two metal rings 16 and 16ª having a layer of packing 17 interposed between them, then screwing the chuck 19 down on these rings and packing closes the cylinder air tight. 20 is the drill shank which rests loosely in the chuck 19. 21 is a three way valve located in the bypass 22 connecting the ends of the cylinder 13 outside of the pistons 12 and 15. The valve 21 is adapted to establish communication between the end chambers or either end chamber with the central chamber.

The extensible air cylinder 36 interposed between the motor 5 and the drill cylinder 13 is formed by the cylinder 24 threaded onto the boss 34 formed on the end of the motor 5 and the cylinder 23 which surrounds cylinder 24 with a slidable, air tight adaptation. 33 is a packing ring around the armature shaft 6 to prevent leakage from the cylinder 36.

The air supply in the cylinder 36 is maintained by an air pump comprising the following parts: The eccentric connecting rod 25 operated by the armature shaft 6 reciprocates the piston 26 in the cylinder 27 which is in communication with the inlet check valve 28 and the outlet check valve 29, when the valve 30 is turned to close the passage 31 to the atmosphere, air is forced through the conduit 32 into the cylinder 36. The illustration shows the valve 30 in the position it occupies when the pump is not working and the reciprocation of the piston 26 in the cylinder 27 simply causes air to be drawn into and expelled from the cylinder 27 through the passage 31. 35 is a small cock to allow the air to escape from the cylinder 36.

The motor is loosely attached to a board which leans against the wall of the stope or a stull and the end of which rests on the ground, when drilling horizontal holes. When drilling uppers the board is supported on stulls and also serves as a platform for the operator to stand on. In most instances, the motor can rest on the ground against the wall or a timber.

The operation of the machine is as follows: The machine being placed in position, air is forced into the cylinder 36 the drill bit is forced against the rock and the piston 12 is reciprocated by the driving mechanism as above described which causes the air contained in the cylinder 13 to operate the hammer piston in the following manner: As the piston 12 moves forward the air between the pistons 12 and 15 is compressed at the same time the air behind the piston

12 is rarefied, so air is drawn through the bypass 22 from in front of the piston 15; when this compression behind and the rarefication in front of the piston 15 is sufficiently great to overcome its inertia it moves forward to strike the striking pin 18. On the backward stroke the reverse condition obtains and the momentum of the piston 15 in its backward stroke is taken up by the elasticity of the air and returned to the forward stroke. It will be observed that the friction on the rotating shaft 7 can be adjusted by screwing the gland 37 against the packing 38 to automatically rotate the drill at any desired rate of speed.

The operation of feeding the drill against the rock is done by controlling the air pressure in the extensible cylinder 36, which pressure is controlled by the position of the valve 30 as it passes from the position shown to close the passage 31. When the passage 31 is entirely closed the maximum pressure that the pump will produce will be obtained. If the passage 31 is not completely closed there will be less pressure in the cylinder 36 so the feeding pressure is under the control of the operator.

Manifestly the principles of this invention may be embodied in a great variety of forms without departing therefrom.

I claim:

1. In a rock drill the combination with a motor, a fluid cylinder, two pistons in said cylinder, means for reciprocating one of said pistons also contained in said cylinder and an extensible air cylinder interposed between said fluid cylinder and said motor.

2. In a rock drill the combination with a motor and a rock drilling engine, of an extensible air cylinder interposed between said motor and said rock drilling engine and means to supply air to the extensible air cylinder.

3. In a rock drill the combination with a motor of a fluid cylinder, two pistons therein, means for reciprocating one of said pistons also contained in said cylinder, an extensible air cylinder interposed between said motor and said fluid cylinder and means to supply air to said fluid cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

OLIN S. PROCTOR.

Witnesses:

JAMES M. CARICO,

R. T. NUNN.