C. B. RICHARDS.

FLUID OPERATED ROCK DRILL.

APPLICATION FILED NOV. 28, 1908.

967,239. Patented Aug. 16, 1910.

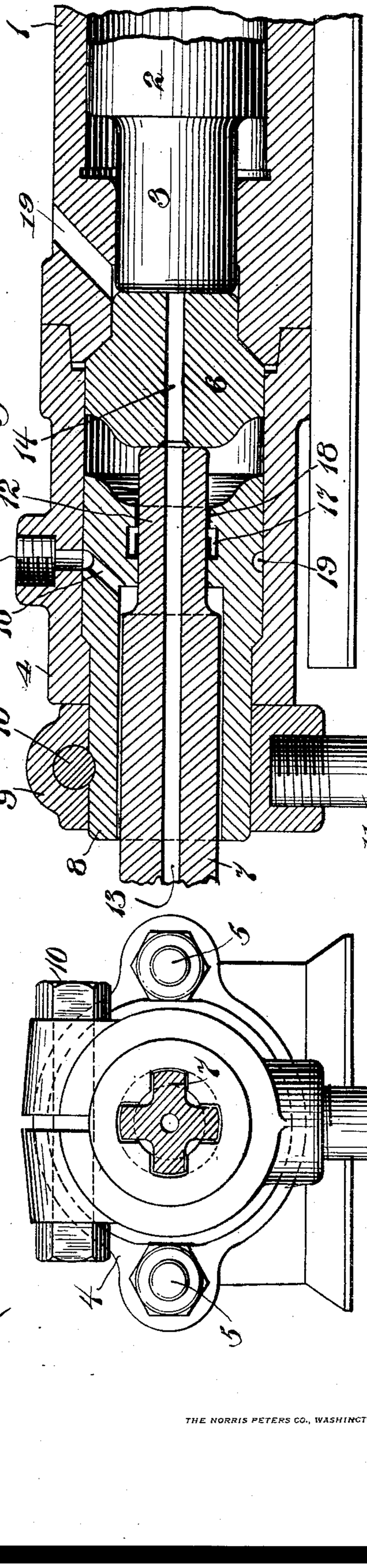

Fig. 2.

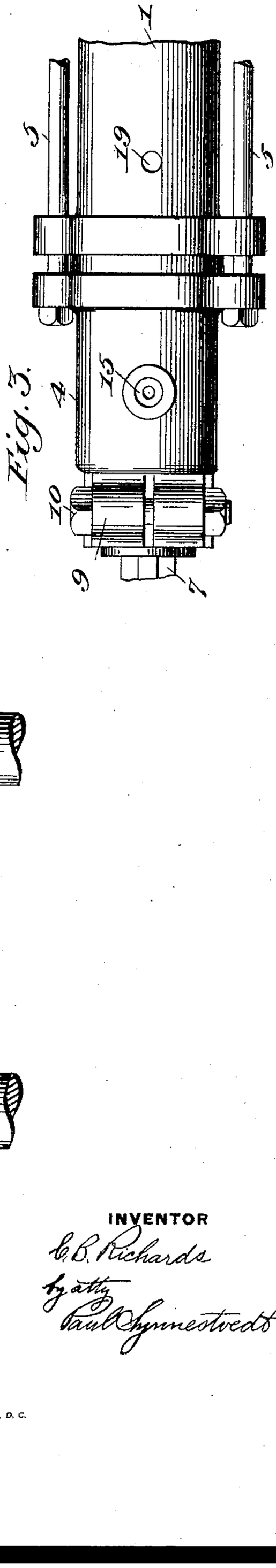

Fig. 3.

Fig. 1.

WITNESSES

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CHARLES B. RICHARDS, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CLEVELAND ROCK DRILL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

FLUID-OPERATED ROCK-DRILL.

967,239. Specification of Letters Patent. **Patented Aug. 16, 1910.**

Application filed November 28, 1908. Serial No. 465,467.

To all whom it may concern:

Be it known that I, CHARLES B. RICHARDS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Fluid-Operated Rock-Drills, of which the following is a specification.

The invention relates to fluid operated rock drills and particularly to the means whereby a fluid may be supplied to cleanse the cavity in the rock and lay the dust as the drilling progresses. The invention has for its primary objects: the provision of a mechanism of the character specified wherein fluid from independent sources may be supplied to the cavity in which the drill is operating; the provision of an arrangement whereby fluid from the operating cylinder may be utilized as a cleaning fluid; and the provision of an arrangement whereby a forward discharge of cleaning fluid may be supplied both through the drill and along its periphery. One embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is an end view of the machine, the drill steel being shown in section,

Figure 2 is a partial longitudinal section through the end of the machine, and

Figure 3 is a plan view on a reduced scale of the front portion of the machine.

Only so much of the machine is illustrated as is necessary to make clear the invention to which this application particularly relates, the general construction of the coöperating machine parts and the manner of mounting the machine proper being shown in my copending application, Serial Number 463,662.

The principal parts of the construction may be enumerated as follows: 1 is the cylinder which carries the valve and feed mechanism, not shown; 2 is the hammer piston provided with a reduced forward end 3 fitting a corresponding reduced portion in the end of the cylinder 1, 4 is the front head of the machine secured in place by means of the tie rods 5—5; 6 is the striking anvil; 7 is the drill steel; 8 is a block or chuck in which the drill steel is mounted for reciprocation, which block is mounted in the head; 9 is a collar encircling the block 8 and held in position by means of the bolt 10; and 11 is a handle mounted in the collar 9 by means of which the block 8 and drill steel 7 carried thereby may be oscillated back and forth as the drilling progresses. It will be understood that the hammer piston is operated in the usual manner by alternately admitting fluid under pressure, such as air or steam, to opposite ends of the cylinder 1 on opposite sides of the piston, and that the mechanism for governing this flow is immaterial, any one of a number of well known valve controls being available for this purpose.

The rear portion 12 of the drill steel 7 is circular in cross section, but the front portion thereof is cruciform in cross section as indicated in Figure 1, and the inner surface of the chuck 8 is formed to fit such cruciform section so that the steel is oscillated by the oscillation of the block 8. The bolt 10 securely clamps the collar 9 about the chuck 8, and its shank fitting in a groove in the periphery of the chuck as indicated in Fig. 2, adds additional security against relative movement of the collar and chuck. The steel 7 is provided with the longitudinally extending passage 13 to permit fluid to be forced through the steel for cleansing the cavity in which the steel is working. Fluid being supplied through a passage 14 in the anvil. This flow through the passage 14 occurs primarily on the rearward movement of the hammer piston as the reduced front end thereof leaves its bore, that is, a portion of the operating fluid admitted to the front of the piston 2 to drive it rearward escapes forwardly through the opening 14, but in addition a limited percentage of the exhaust also passes out in this manner on the forward movement of the hammer piston and is thus utilized as a cleansing means. A large portion of the forward exhaust escapes through the passage 19. A mixture of air and water is also supplied for cleaning the cavity in the rock by means of a connection 15 to which a pipe leading to a source of supply under pressure is secured. While the mixture of air and water is preferably used, other fluids might be used, this being immaterial in so far as the machine structure is concerned. An oblique passage 16 leads from the connection 15 to the rear end of the bore of the chuck 8, and the fluid thus supplied is permitted to escape forwardly along the periphery of the steel by reason of the loose fit of the steel in the chuck as indicated in Figure 1. The rear portion 12 of the steel is packed in the chuck by means of

the U shape rubber ring 17, pressure being admitted between the sides of the U to make tight contact thereof with the drill shank and chuck by means of the annular passage 18 leading to the chamber at the rear of the chuck. The collar 9 serves the double function of providing a means for rotating the drill steel, and of preventing any rearward movement of the chuck 8 with respect to the head 4 in which it is mounted. The oblique connection 16 is maintained in constant communication with the source of fluid supply, while the chuck is oscillated by reason of the groove 19.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:—

1. In combination in a drilling machine, a chuck, a reciprocatory steel therein provided with a passage, connections whereby fluid may be supplied intermediate the steel and the chuck, and connecting means whereby a fluid under pressure may be supplied to the said passage from the drill.

2. In combination in a fluid operated drilling machine having an operating cylinder, a chuck, a reciprocatory steel therein provided with a passage, connections whereby fluid may be supplied intermediate the steel and its chuck, and connecting means whereby fluid from the operating cylinder may be directed through the said passage, the chuck and steel being constructed to permit the longitudinal outflow of fluid therebetween.

3. In combination in a fluid operated drilling machine having an operating cylinder, a chuck, a reciprocating steel therein, a pair of independent passageways extending alongside of each other longitudinally of the steel in the chuck and steel, means whereby the exhaust from the operating cylinder is supplied to one of the passageways, and a fluid supply connection whereby fluid under pressure from an independent source of supply may be supplied to the other passageway.

4. In combination in a fluid operated drilling machine having an operating cylinder, a chuck, a reciprocatory steel therein provided with a passage, means whereby fluid from the operating cylinder is directed through the said passage, a fluid supply connection leading from the inner surface of the chuck to the exterior of the drill, and packing means between the rear portion of the steel and the chuck, the chuck and steel being constructed to permit the longitudinal outflow of fluid therebetween.

5. In combination in a fluid operated drilling machine having an operating cylinder, a hammer piston, a chuck, a reciprocatory steel therein provided with a longitudinal passage, a reciprocatory striking anvil intermediate the steel and hammer piston provided with a passage registering with the end of the passage in the steel, and a supply connection leading from the inner surface of the chuck to the exterior of the drill, the chuck and steel being constructed to permit the longitudinal outflow of fluid therebetween.

6. In combination in a fluid operated drilling machine, a chuck having a bore of angular cross section at its front portion and of reduced diameter at its rear portion and provided with a supply passage leading from the rear end of the angular portion of the bore, and a drill steel of angular cross section at its front portion to fit the angular portion of the bore and reduced at its rear portion to fit the reduced portion of the bore, space being provided intermediate the angular portion of the drill and the bore of the chuck for the passage of fluid.

7. In combination in a fluid operated drilling machine, a chuck having a bore of cruciform cross section at its front portion and reduced circular cross section at its rear portion and provided with a fluid supply passage leading from the rear end of the cruciform portion of the bore, a drill steel of cruciform cross section at its front portion to fit the cruciform portion of the bore, and of circular cross section at its rear portion to fit the circular portion of the bore, and a packing for the circular portion of the drill steel, space being provided between the cruciform portion of the drill and the bore for the passage of fluid.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

CHARLES B. RICHARDS.

Witnesses:
GEO. H. HALL,
F. J. CONNELLY.