

June 30, 1953

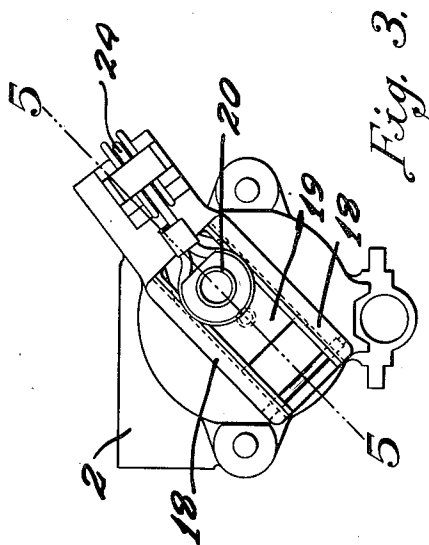
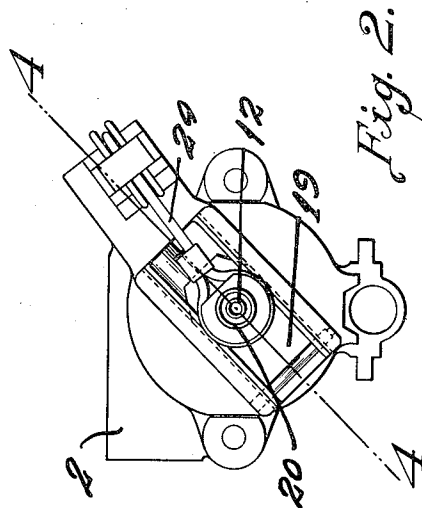
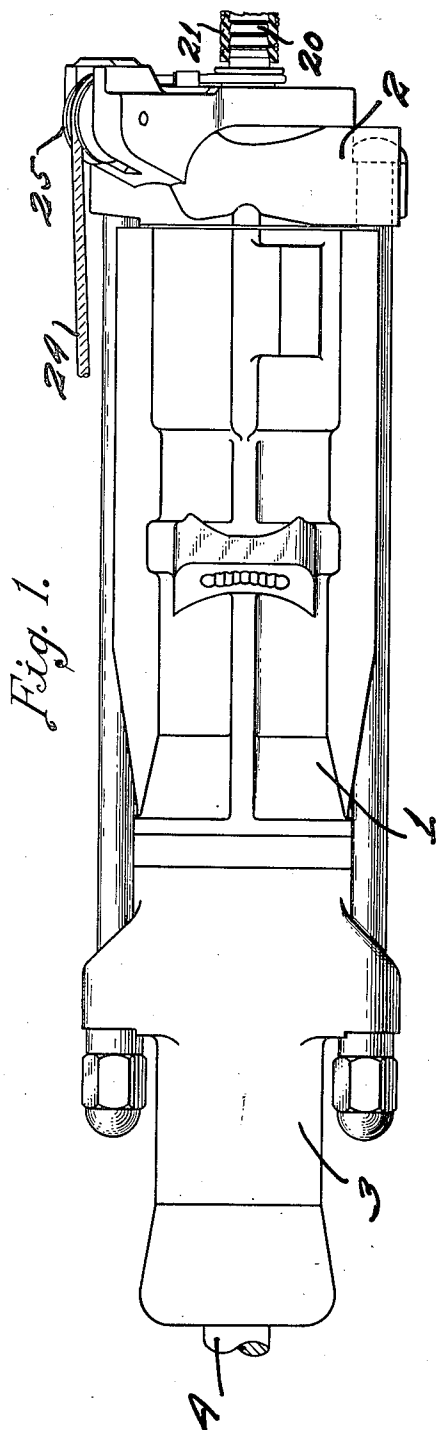
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2,643,641

ROCK DRILL

Filed May 13, 1950

2 Sheets-Sheet 1



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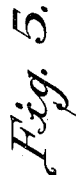
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ROCK DRILL

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2 Sheets-Sheet 2



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2,643,641

ROCK DRILL

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Application May 13, 1950, Serial No. 161,767

7 Claims. (Cl. 121-10)

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My invention relates to improvements in rock drills and is more particularly directed to the provision of means whereby fluid under pressure is utilized to remove cuttings from the hole being drilled.

The invention further contemplates the provision of means whereby the cuttings from the hole being drilled may normally be removed by creating a suction within the hollow steel and removing the cuttings through the steel and drill to atmosphere.

A further object of the invention is to provide means whereby fluid normally creating a suction within the drill steel is reversed in its direction of flow and permitted to pass directly through the hollow drill steel to the hole being drilled, thus blowing the cuttings out of the hole and free of the steel.

Still another object of the invention is the provision of control means whereby the fluid used to remove the cuttings from the hole being drilled may be directed to either of the two methods described; that of blowing directly into the hole and removing the cuttings or passing the fluid to atmosphere and creating a suction within the hollow drill steel, thus drawing the cuttings out through the steel and drill.

Another object of the invention lies in the provision of manually actuated means whereby the flow of fluid may be alternately changed from the direct flow to the suction method, thus agitating the cuttings and preventing any possible clogging of the drill steel.

Other objects of the invention will hereinafter appear, and to all of these ends the invention consists of features of construction, arrangements of parts and combination of elements substantially as hereinafter described and claimed in the specifications and shown in the accompanying drawings, in which:

Figure 1 is a side elevation of a rock drill, showing the drill steel and the manually operated means for controlling the flow of cleansing fluid.

Figure 2 is a top view of the drill showing the normal position of the manually controlled means for the flow of cleansing fluid.

Figure 3 is a view similar to Figure 2, showing the position of the controlled means when directing cleansing fluid downwardly through the drill steel.

Figure 4 is a sectional view taken on the line 4-4 of Figure 2, and

Figure 5 is a similar view taken on the line 5-5 of Figure 3.

Briefly, the invention about to be described

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contemplates provision of means whereby a portion of the operating fluid of a rock drill may be used to remove cuttings from the hole being drilled and in the normal operation as herein-
after described, these cuttings are moved by suction created by the fluid. Heretofore it has been the practice to permit a portion of the operating fluid to flow directly through the hollow steel, the result being that the cuttings within the drill hole are blown free of the hole and steel. It has also been common in the art to remove the cuttings by creating a suction within the hollow drill steel, permitting these cuttings to be sucked out through the steel to atmosphere.

The present invention lies in the provision of means whereby the flow of cleansing fluid may be selectively controlled to clean the hole either by a direct blast through the steel and into the hole or normally by permitting the cuttings to be sucked through the hollow steel and passed to atmosphere. It is further an object of the invention to alternately control the flow of this fluid so that the cuttings within the hole may be agitated and alternately removed by a direct blast into the hole or by the suction method.

Referring to the accompanying drawings in detail, the numeral 1 indicates a conventional cylinder of a rock drill having at one end a backhead 2 and at its front end a chuck 3 for the reception of a hollow drill steel 4 struck by a reciprocating hammer 5.

The reciprocating hammer 5 is actuated by fluid alternately directed to its sides by a distributing valve 6. The fluid normally entering the distributing valve chamber through an intake port 7.

Positioned centrally of the cylinder 1 and extending downwardly of the backhead 2 and through the distributing valve 6 and hammer 5, and projecting into the end of the hollow drill steel 4, is a tube 8 the upper end of which is flared and supported within the backhead by suitable packing 9; while its other end is receivable within a slightly engaged bore 10 of the drill steel. The drill steel carries a packing ring designated at 11, slidable upon the exterior of the tube 8 and supporting the same.

Positioned within the backhead 2 and abutting the end of the water tube 8 is a nipple 12 held in place by a sleeve 13 pressed into an enlarged bore of the backhead surrounding the nipple 12. It will be noted that a space is provided between the outer ends of the nipple 12 and sleeve 13, the purpose of which will hereinafter be apparent.

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The sleeve 13 is further provided with ports 14 communicating with an annular ring or channel 15 formed in the periphery of the sleeve 13. The ring or channel 15 being in communication with a passageway 16 leading to an annular ring 17 formed in the front face of the backhead 2 and communicating with the fluid inlet passageway 7.

The backhead 2 is provided with oppositely disposed guideways 18 having slidable therein a block 19. This block 19 has centrally thereof a nipple 20 to the outer end of which is connected a hose 21, the purpose of which will hereinafter be apparent.

Retaining the block 19 within its guideways 18 is a pin 22 and against which the block 19 is normally maintained by a spring 23 positioned within a housing formed at the opposite end of the guideways and on the backhead 2.

The block 19 is further provided with a centrally disposed flange surrounding the nipple 20 and around which the looped end of an operating cable 24 is positioned, the operating cable passing over a pulley 25 mounted for rotary movement on the backhead.

With the structure thus described, it is apparent that by pulling upon the cable 24, the block 19 may be moved from the position shown in Figure 4 to the position shown in Figure 5 where the flow of fluid is directed from the passageway 16, nipple 12, through the hollow tube 8 and steel 4, directly to the hole being drilled, removing the cuttings and dust therefrom.

Upon releasing the cable 24, the spring 23 returns the sliding block to the position shown in Figure 4 whereby the spring 23 maintains the block against the crosspin 22 and at the same time the nipple 20 is aligned with the end of the nipple 12, and tube 8, thus permitting the free flow of air from the supply 7, ring 17 through the ports 14 and around the rear end of the nipple 12 to atmosphere through the nipple 20. Air flowing over the free end of the nipple 12 creates within the tube a suction removing cuttings from the cutting face of the hollow drill steel 4.

It is further apparent that by rapid movement of the block 19 from the position shown in Figure 4 to that disclosed in Figure 5, the flow of cleansing fluid will alternately be changed from the direct blasting operation to a vacuum operation thus agitating the cuttings within the hole and eliminating the possible clogging of the drill steel.

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 departure from the spirit or sacrifice any of the invention.

What I claim is:

1. A fluid operated drill comprising a casing, a backhead closing the rear end of the casing having connected thereto a fluid supply, a hollow drill steel supported within the front end of the casing, a tube extending from the backhead into the steel, a fluid operated hammer surrounding the tube and movable within the casing to impart blows to the steel, passageways within the backhead leading from the supply to and adjacent the tube, a movable element directing fluid to the tube and steel to blow cuttings from the hole being drilled, and said element movable to a position establishing communication between said

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tube and atmosphere, permitting fluid adjacent the tube end to pass thereover creating a suction within the tube and steel to draw the cuttings upwardly through the tube and steel to atmosphere.

2. A fluid operated drill comprising a casing, a backhead closing the rear end of the casing having connected thereto a fluid supply, a hollow drill steel supported in the front end of the casing, a tube positioned within the backhead and communicating with the steel, a hammer surrounding the tube and movable within the casing imparting blows to the steel, passageways leading from the supply to and adjacent the rear end of the tube, an element controlling the directional flow of fluid with respect to said tube, and said element subject to selective movement creating reversible pressures within the tube and steel for removing the cuttings from the hole being drilled.

3. A fluid operated drill comprising a casing having a hammer movable therein, a backhead closing one end of the casing and having connected thereto a fluid supply, a hollow drill steel supported within the front end of the casing and adapted to be struck by the hammer, a tube within the casing supported by the backhead and extending into the steel, passageways within the backhead leading from the supply to a point adjacent the tube end, a movable element carried by the backhead directing fluid through said tube when in one position, and said element when in another position permitting fluid to pass directly to atmosphere over the tube end creating therein a suction for removing cuttings from the hole being drilled.

4. A fluid operated drill comprising a casing having a hammer movable therein, a backhead closing one end of the casing and having connected thereto a fluid supply, a hollow drill steel supported within the front end of the casing and adapted to be struck by the hammer, a tube within the casing supported by the backhead and extending into the steel, passageways within the backhead leading from the supply to a point adjacent the tube end, an element movable within the backhead, said element when in one position directing fluid from a point adjacent the tube end through the same to blow cuttings from the hole being drilled, and said element when moved to another position permitting fluid to pass over the tube end to atmosphere creating within the tube a suction for withdrawing cuttings from the hole being drilled.

5. A fluid operated drill comprising a casing having a hammer movable therein, a backhead closing one end of the casing and having connected thereto a fluid supply, a hollow drill steel supported within the front end of the casing and adapted to be struck by the hammer, a tube within the casing supported by the backhead and extending into the steel, passageways within the backhead leading from the supply to a point adjacent the tube end, means movable within the backhead selectively directing the flow of fluid from a point adjacent the tube end downwardly through the tube to blow the cuttings from the hole being drilled and over the tube end to atmosphere creating within the tube a suction for drawing cuttings from the hole being drilled upwardly of the tube to atmosphere, and said means being movable from one position to another in rapid succession.

6. A fluid operated drill comprising a casing having a hammer movable therein, a backhead

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closing one end of the casing and having connected thereto a fluid supply, a hollow drill steel supported within the front end of the casing and adapted to be struck by the hammer, a tube within the casing supported by the backhead and extending into the steel, passageways within the backhead leading from the supply to a point adjacent the tube end, a nipple movable within the backhead serving to open and close the tube end to atmosphere, and said nipple when moved from one functioning position to another creating reversible pressures within the tube and steel for removing cuttings from the hole being drilled.

7. A fluid operated drill comprising a casing having a hammer movable therein, a backhead closing one end of the casing and having connected thereto a fluid supply, a hollow drill steel supported within the front end of the casing and adapted to be struck by the hammer, a tube within the casing supported by the backhead and extending into the steel, passageways within

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the backhead leading from the supply to a point adjacent the tube end, a movable element carried by the backhead directing fluid through said tube when in one position, said element when in another position permitting fluid to pass directly to atmosphere over the tube end creating therein a suction, and the reversible pressures when thus created, removing cuttings from the hole being drilled.

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