Aug. 17, 1937. J. C. CURTIS 2,090,032

BLOWING DEVICE

Filed Dec. 28, 1936

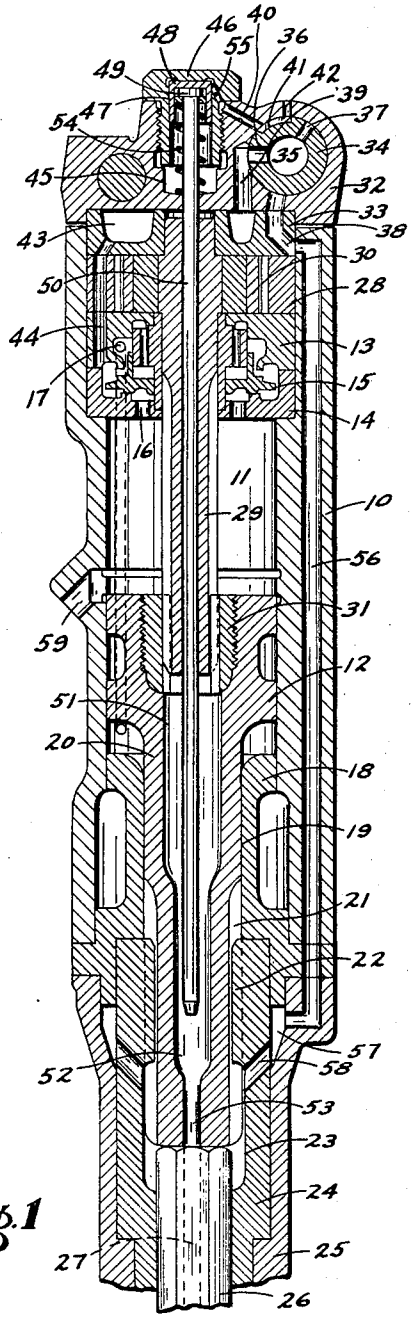


Fig. 1

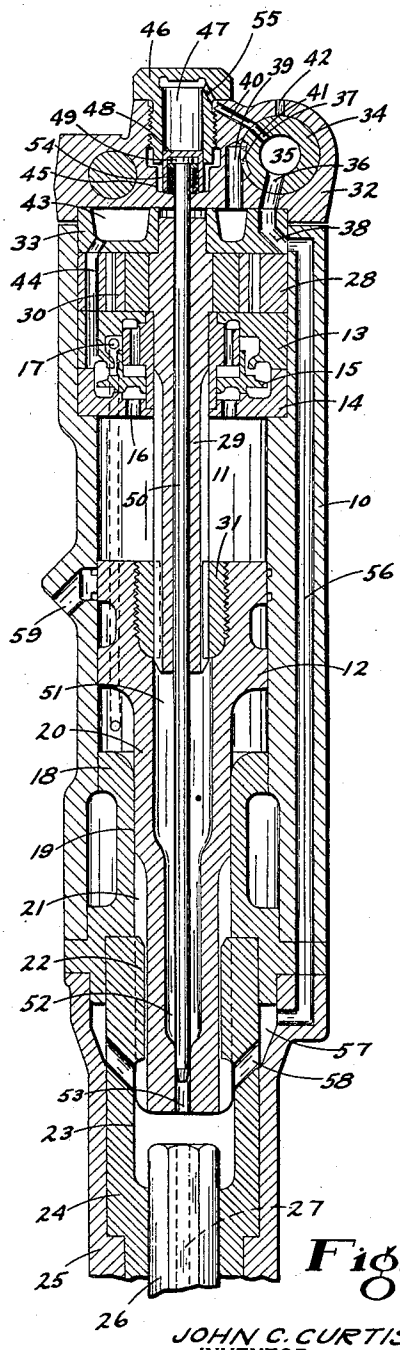


Fig. 2

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2,090,032

BLOWING DEVICE

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Application December 28, 1936, Serial No. 117,746

5 Claims. (Cl. 121—10)

This invention relates broadly to rock drills, but more particularly to a blowing device for fluid actuated rock drills of the hammer type.

One object of this invention is to effectively supply pressure fluid to the bottom of the drill hole for removing the cuttings therefrom.

Another object of this invention is to provide a rock drill having a passage for intermittently admitting motive fluid to the drill steel during the normal operation of the drill, with means for automatically closing that passage during the blowing operation.

Another object of this invention is to provide a rock drill blowing device of simple construction, which is strong, durable and efficient.

In the drawing:

Fig. 1 represents a longitudinal sectional view of a rock drill with the parts positioned for normal operation.

Fig. 2 is a view similar to Fig. 1 with the parts positioned for blowing operation.

Referring to the drawing in which like symbols designate corresponding parts throughout the several views, 10 represents the main housing formed with a cylindrical chamber 11 having, reciprocable therein, a hammer piston 12. The upper end of the chamber 11 is enlarged to accommodate a valve block 13, and valve cap 14, within which is reciprocably mounted a fluid actuated valve 15 controlling ports 16 and 17 which lead respectively into the upper and lower end of the chamber 11.

Secured within the lower portion of the chamber 11, there is a spacer 18 formed with a through bore 19 adapted to slidably receive a closely fitted stem 20, which stem forms a part of the piston 12. The lower portion of the stem 20 is provided with splines 21 slidably engaging similar splines 22 formed within the bore 23 of a chuck 24, which chuck is rotatably mounted within a front housing 25. The chuck 24 is also machined to slidably but non-rotatably receive a drill steel 26 which extends into the bore 23. Through the drill steel 26 is provided a bore 27.

Located in the chamber 11 above the valve block 13, there is a rotation mechanism including a ratchet ring 28 associated with a rifle bar 29 through pawls 30. This bar extends into the hammer 12 for operative engagement with a rifle nut 31, through which rotation is transmitted to the piston, and in turn to the drill steel through the chuck 24.

Secured on top of the housing 10, there is a head 32 engaging a plate 33 mounted between the head 32 and the ratchet ring 28. The head 32 is machined to rotatably receive a throttle valve 34 formed with a central or inlet port 35 having motive fluid admitted therein. Radially disposed through the throttle valve 34 there are ports 36 and 37, the former capable of communication with either a port 38 formed through the plate 33 or a port 39 formed within the head 32, while the latter is capable of communication with a smaller port 40 provided within the head 32. Between the ports 36 and 37, the throttle valve is formed with a groove 41 capable of affording communication between the port 40 and a vent 42.

The port 39 opens into a groove 43 formed within the plate 33, which groove is in constant communication with the valve 15 through ports 44.

The head 32 is formed with a threaded bore 45 disposed coaxially with the chamber 11 and having secured therein a plug 46. This plug is formed with a flat bottom bore 47 having slidably mounted therein a cup-shaped bushing 48 accommodating the head 49 of a needle 50. This pin or needle extends through the rifle bar into the hammer's stem 20, which is formed with a through bore having three different diameters, one enlarged diameter 51 accommodating the rifle bar 29, an intermediate diameter 52, and a small diameter 53 adapted to slidably receive the pointed end portion of the needle 50. Acting under the head of the needle head 49, there is a compression spring 54 urging the needle into engagement with the bottom of the bushing bore 47, while this last bore is in constant communication with the port 40 through a port 55. Formed within the side wall of the housing 10, there is a port 56 having one end opening into the port 38, while the other end opens into an annular groove 57 located around the chuck 24, which groove is in constant communication with the chuck bore 23 through a port 58.

Leading from the chamber 11 to the atmosphere, there is also provided the usual exhaust passage 59.

In the normal operation of the drill, the throttle valve 32 is positioned as shown in Fig. 1 for admitting motive fluid from the throttle valve bore 33 to the valve 15 through the throttle valve port 36, the head port 39, the groove 43 and the ports 44. From the valve 15, the motive fluid will flow alternatively into the upper and lower portion of the chamber 11 through the ports 16 and 17 respectively for effecting the reciprocation of the piston 12 and the consequential distribution of impacts on the drill steel 26. Dur-

ing the downward stroke of the hammer, and immediately before the hammer uncovers the exhaust port 59, the needle 50 is positioned away from the piston bore portion 53, allowing thereby the motive fluid admitted into the chamber 11 through the ports 16 to flow through the piston port into the chuck chamber 23, from where it is free to flow to the bottom of the drilled hole through the drill steel bore 27 for maintaining the cuttings away from the cutting edge of the drill steel. When the throttle valve is positioned as shown in Fig. 1, that is for normal operation, the port 40 is in communication with the vent 42 through the throttle valve groove 41, thereby venting the bottom of the plug bore 47 to the atmosphere through the port 55.

When it is desired to clean the drilled hole, the throttle valve 34 is positioned as shown in Fig. 2. In this instance motive fluid from the throttle valve port 35 is admitted into the chuck bore 23 via the throttle valve port 36, ports 38 and 56, annular groove 57 and port 58. In the bore 23, the motive fluid will normally exert pressure on the end of the hammer stem 20 to lift the hammer until the latter covers the exhaust port 59. Simultaneously the pressure fluid is also admitted to the bottom of the plug bore 47 via the ports 37, 40 and 55, exerting pressure on the bushing 48 for driving the needle 50 into the position shown in Fig. 2, that is in a closed position relative to the piston port 53. Since the piston port is closed by the needle 50, the entire amount of the pressure fluid admitted into the chuck bore 23 is admitted to the bottom of the drilled hole through the drill steel bore 27 for effectively blowing the cuttings out of the drilled hole.

When it is desired to resume the drilling operation, the throttle valve 34 may again be positioned as shown in Fig. 1. In this instance, the plug bore 47 is again vented to the atmosphere through the ports 55 and 40, valve groove 41 and vent 42, allowing thereby the spring 54 to move the needle 50 into the position shown in Fig. 1 to enable an intermittent admission of the motive fluid to the bottom of the drilled hole.

From the foregoing description, it is evident that the machine is provided with a port for admitting an intermittent supply of cleansing fluid to the drilled hole during the normal operation of the drill. When the throttle valve is rotated into the blowing position, this passage is automatically closed by the needle to prevent any wastage of cleansing fluid, which would otherwise flow through the hammer and escape to the atmosphere via the exhaust port 59.

I claim:

1. In a fluid actuated rock drill, the combination of a cylinder and a hammer piston, a d steel adapted to receive the impacts of the ha mer piston, means including a port through hammer piston intermittently admitting clea ing fluid to the drill steel, and means for adm ting cleansing fluid to said drill steel indepen ently of said port and for simultaneously closi said port.

2. In a fluid actuated rock drill, the combin tion of a cylinder and a hammer piston, a dr steel adapted to receive the impacts of the han mer piston, means including a port through sa hammer piston intermittently admitting clean ing fluid to the drill steel, a needle slidable with in said hammer piston and capable of closin said port, and means for admitting cleansin fluid to said drill steel independently of said po and for effecting the slidable movement of sai needle for closing said port.

3. In a fluid actuated rock drill, the combina tion of a cylinder, of a hammer piston recipro cable therein and having a port, a drill stee adapted to receive the impacts of the hamme piston and having a bore, means for admitting pressure fluid into said cylinder for actuating said hammer piston and for admitting from said cylinder an intermittent supply of pressure fluid to the bore of said drill steel via said port, and unitary operable means for shutting off the supply of pressure fluid to said cylinder, shutting off said port and admitting a constant supply of pressure fluid to the bore of said drill steel.

4. In a fluid actuated rock drill, the combination of a cylinder, of a hammer piston therein, a port through said piston, a drill steel adapted to receive the impacts of said piston and having a bore therethrough, means for intermittently admitting pressure fluid to one end of said piston and therefrom to the bore of said drill steel via said port, and means for admitting a constant supply of pressure fluid to the other end of said piston and therefrom to the bore of said drill steel and for automatically closing said port.

5. In a fluid actuated rock drill, the combination of a cylinder, of a hammer piston reciprocable therein, a port through said piston, a needle movable within said port for closing the latter, a drill steel adapted to receive the impacts of said piston and having a bore therethrough, means for intermittently admitting pressure fluid to one end of said piston and therefrom to the bore of said drill steel via said port, and means for admitting a constant supply of pressure fluid to the other end of said piston and therefrom to the bore of said drill steel and for automatically actuating said needle for closing said port.

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