Dec. 26, 1933. J. C. CURTIS 1,940,846

ROCK DRILL BLOWING DEVICE

Filed July 30, 1932

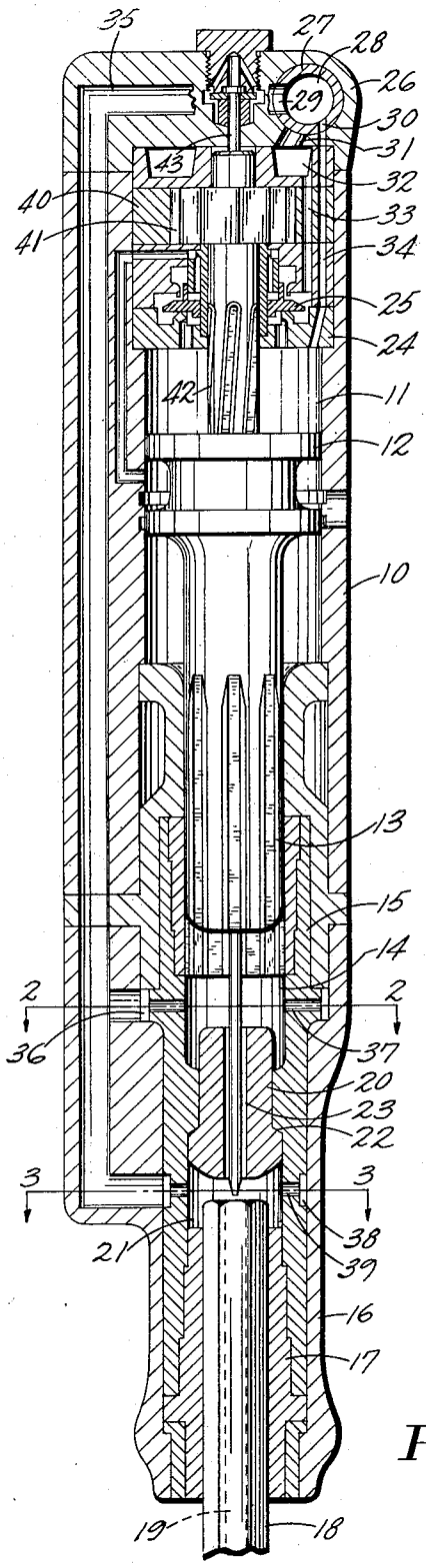



Fig. 1

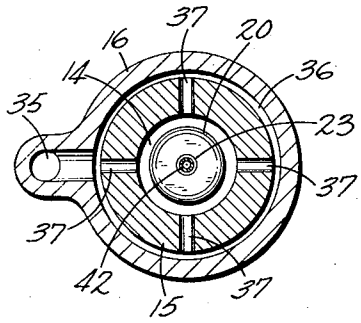



Fig. 2

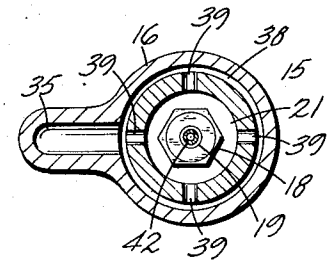



Fig. 3

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Patented Dec. 26, 1933 1,940,846

# UNITED STATES PATENT OFFICE

1,940,846

## ROCK DRILL BLOWING DEVICE

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Application July 30, 1932. Serial No. 626,259

5 Claims. (Cl. 121—10)

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

One of the objects of the invention is to produce a rock drill with a blowing device capable of admitting pressure fluid under full line pressure to the cutting tool for cleaning the hole being drilled.

Another object of this invention is to produce a blowing device for rock drill which is simple in design and capable of easy operation.

Other objects and advantages more or less ancillary to the foregoing and the manner in which the various objects are attained reside in the specific construction and arrangement of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification, in the claims of which there are assembled certain specific combinations of parts and specific constructions indicative of the scope and spirit of the invention.

In the drawing:

Fig. 1 is a longitudinal view of a rock drill embodying the invention.

Fig. 2 is a cross sectional view taken in a plane indicated by line 2—2 in Fig. 1.

Fig. 3 is a view similar to Fig. 2 taken in a plane indicated by line 3—3 in Fig. 1.

The embodiment of the invention chosen for the purpose of illustration comprises a rock drill having a cylinder 10 formed with a piston chamber 11. Reciprocably mounted within the chamber 11, there is a piston 12 formed with a fluted extension 13, which is capable of slidable but non-rotatable engagement within the fluted bore 14 of a chuck 15. This chuck is rotatably mounted within a front housing 16, attached to the cylinder 10 in any suitable manner. Secured within the front end of the chuck 15 in pressed fit relation therewith, there is a chuck bushing 17 conveniently machined to slidably receive the shank 18 of a working implement.

The working implement is provided with a centrally disposed orifice 19 through which pressure fluid may be admitted to the cutting edge of the implement for cleaning the drilled hole. Interposed between the end of the piston fluted portion 13 and the end of the shank 18, there is a tappet 20 slidably mounted within a tappet chamber 21 in fluid tight engagement with the wall thereof. The tappet 20 is formed of differential diameters, providing at their intersection, a tappet seat 22 capable of engagement with the chuck 15 to limit its rearward travel. This tappet is also provided with a centrally disposed orifice 23 somewhat larger than the orifice 19.

Secured within the rear end of the cylinder 10, there is a valve block 24, within which there is reciprocably mounted a fluid actuated valve 25 for controlling the admission of the pressure into the piston chamber 11 to actuate the piston.

The machine is terminated by a backhead 26 having, rotatably disposed therein, a throttle valve 27, which is formed with a centrally located bore 28 into which pressure fluid may be admitted. The throttle valve is also provided with radially disposed enlarged orifice 29, and restricted port 30. Leading from the throttle valve 27 there is provided an enlarged passage 31 opening into an annular recess 32, which is in constant communication with valve 25 through a plurality of passages 33. Capable of communication with the throttle valve restricted port 30, there is a passage 34 opening within the rear end of the piston chamber 11. Leading from the throttle valve to the forward portion of the machine, there is an enlarged passage 35. This passage is in constant communication with the bore 14 of the chuck 15, through a circular space 36 provided between the chuck 15 and its housing 16, and through a plurality of radially disposed ports 37, opening into the space 36 and bore 14. The enlarged passage 35 is also in communication with the tappet chamber 21 through an annular recess 38 formed on the external wall of the chuck 15, and through a plurality of radially disposed passages 39, leading from the recess 38 into the tappet chamber 21.

Disposed between the backhead 26 and the valve block 24, there is a ratchet mechanism comprising a toothed ring 40 having rotatable therein the head 41 of a rifled stem 42. The stem 42 is capable of slidable engagement with the fluted bore of the piston 12, and within its head there is disposed a plurality of pawls and plungers effecting the rotation of the piston 12 in a manner common to tools of this type.

Secured within the backhead 26, there is a tube 43 extending into the orifice 19 of the tool implement. This tube is adapted to carry cleaning fluid from the backhead to the cutting edge of the tool implement to clean the drilled hole during the normal operation of the machine.

When the throttle valve 27 is located to position the throttle valve enlarged orifice 29 in communication with enlarged passage 31, pressure fluid is admitted into the valve block 24 to be controlled by the fluid actuated valve 25 and distributed into the piston chamber 11 to actuate

the piston 12. During its reciprocation, the piston 12 will deliver its blows to the tappet 20, which will transmit the blows to the tool implement by the medium of its shank 18, accomplishing thereby the drilling of the hole.

When it is desired to clean the drilled hole, the throttle valve may be positioned as illustrated in Fig. 1. In that position the admission of the pressure fluid into the valve block 24 is shut off. The throttle valve enlarged orifice 29 being in communication with the enlarged passage 35, pressure fluid will be admitted into the bore 14 through the circular space 36 and ports 37. The pressure fluid admitted into the bore 14 will act upon the front end of the piston fluted extension 13 to move the piston 12 rearwardly or away from the tappet 20, thus allowing the pressure fluid to flow through the tappet orifice 23 into the orifice 19 of the tool implement and to the cutting edge of the tool to clean the hole being drilled. Simultaneously pressure fluid is admitted into the rear end of the piston chamber 11 to act against the piston 12 to maintain the piston substantially in the position illustrated in Fig. 1. The port 34 being smaller than the enlarged orifice 35, the pressure within the piston chamber 11 will be less than the pressure within the bore 14. However, the pressure within the piston chamber 11 will slowly increase to move the piston 12 forwardly against the pressure exerted upon the front end of the piston stem 13. When the piston finally uncovers the exhaust passage 44 provided through the wall of the cylinder 10, the pressure within the rear end of the piston chamber 11 will drop, allowing the piston 12 to move rearwardly. Thus the piston is capable of reciprocation but is held away from the end of the tappet to allow the passage of the pressure fluid into the tappet orifice 23. It will be noted that during the drilling operation, when the cutting edge of the tool implement is maintained against the work, the operator may blow the chips away from the cutting edge of the tool by simply manipulating the throttle valve 27.

At the same time that the pressure fluid is admitted into the bore 14, it is also admitted into the chamber 21 through the annular recess 38 and ports 39 to act against the front face of the tappet 20, and maintain its seat 22 in engagement with the chuck 15. At the end of the drilling operation, when the machine is retracted from the work, the pressure into the tappet chamber 21 will act on the end of the shank 18 to move it away from the tappet 20, thus allowing an additional amount of pressure fluid to flow into the orifice 19 to the cutting edge of the working implement. The combined pressure fluid from the bore 14 and tappet chamber 21, flowing into the bottom of the drilled hole will be sufficient to afford an efficient blowing device. By the simple manipulation of the throttle valve, pressure fluid may be admitted to the cutting edge of the working implement from two different sources, the pressure fluid from one of these sources being controlled by the retraction of the machine from the work.

Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modification of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a fluid actuated machine comprising a housing having a piston chamber with a piston reciprocable therein, said piston having a stem extending within a member rotatably mounted within the front housing of said machine and capable to receive the shank of a working implement having a bore therethrough, a tappet interposed between said stem and shank and capable to receive the blows of the former and transmit them to the latter, a fluid actuated valve for distributing the pressure fluid into said piston chamber to actuate said piston, a throttle valve for controlling the admission of the pressure fluid to said fluid actuated valve, passages controlled by said throttle valve for admitting pressure fluid to both ends of said tappet, the pressure fluid admitted to one end of said tappet acting upon said stem to maintain the latter in spaced relation with the former, a bore through said tappet for conveying pressure fluid from one end of said tappet into the bore of said working implement when the latter is held in engagement with said tappet, the pressure fluid from the other end of said tappet being capable of flow into the bore of said working implement when the latter is maintained in spaced relation with said tappet, and means for simultaneously admitting pressure fluid into one end of said piston chamber to prevent the complete travel of said piston when pressure fluid acts on the front end of said stem.

2. In a fluid actuated machine comprising a housing having a piston chamber with a piston reciprocable therein, said piston having a stem extending within a member rotatably mounted within the front housing of said machine and capable to receive the shank of a working implement having a bore therethrough, a tappet slidably mounted within said member and interposed between said stem and shank to receive the blows of the former and transmit the same to the latter, the ends of said tappet constituting differential areas, passages controlled by a throttle valve for simultaneously admitting pressure fluid to each of said areas, the pressure acting on the enlarged of said areas overcoming the pressure acting on the restricted of said areas to maintain said tappet at one extreme end of its travel, the pressure fluid admitted to said restricted area acting upon said stem to maintain the latter away from the former and allow the passage of pressure fluid therebetween, a bore through said tappet to convey said last mentioned pressure fluid into the bore of said working implement, the pressure fluid from the enlarged of said areas being adapted to flow into the bore of said tool implement when the latter is maintained in spaced relation with said tappet, and means for simultaneously admitting pressure fluid into one end of said piston chamber to prevent the complete travel of said piston when pressure fluid acts on the front end of said stem.

3. In a fluid actuated machine comprising a housing having a piston chamber with a piston reciprocable therein, a member rotatably mounted within the front end of said machine and capable to slidably receive the shank of a working implement, a tappet interposed between said piston and said shank to transmit the blows of the former to the latter, said tappet being maintained in engagement with said shank by the force applied to said machine to secure said working implement against the work, passages for admitting

pressure fluid to each end of said tappet, means through said tappet to admit a restricted amount of pressure fluid from one end thereof into the bore of said working implement when the latter is held against the work, and means for admitting an additional amount of pressure fluid into the bore of said working implement from the other end of said tappet when the machine is retracted from the work.

4. In a fluid actuated machine comprising a housing having a piston chamber with a piston reciprocable therein, a member rotatably mounted within the front end of said machine and capable to slidably receive the shank of a working implement, a tappet interposed between said piston and said shank to transmit the blows of the former to the latter, said tappet being maintained in engagement with said shank by the force applied to said machine to secure said working implement against the work, passages controlled by a valve for admitting pressure fluid between the engaging surfaces of said tappet and shank, thus exerting pressure on said shank to move it away from said tappet when the machine is retracted from the work, permitting thereby the admission of said pressure fluid into the bore of said working implement to clean the drilled hole.

5. In a fluid actuated machine comprising a housing having a piston chamber with a piston reciprocable therein, a hollow drilling tool implement having a shank slidably mounted into the front end of said machine, a member interposed between said piston and said shank for transmitting the blows of the former to the latter, and means for admitting pressure fluid between the engaging surfaces of said member and shank, permitting thereby the admission of pressure fluid through said hollow tool implement to clean the drilled hole.

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