

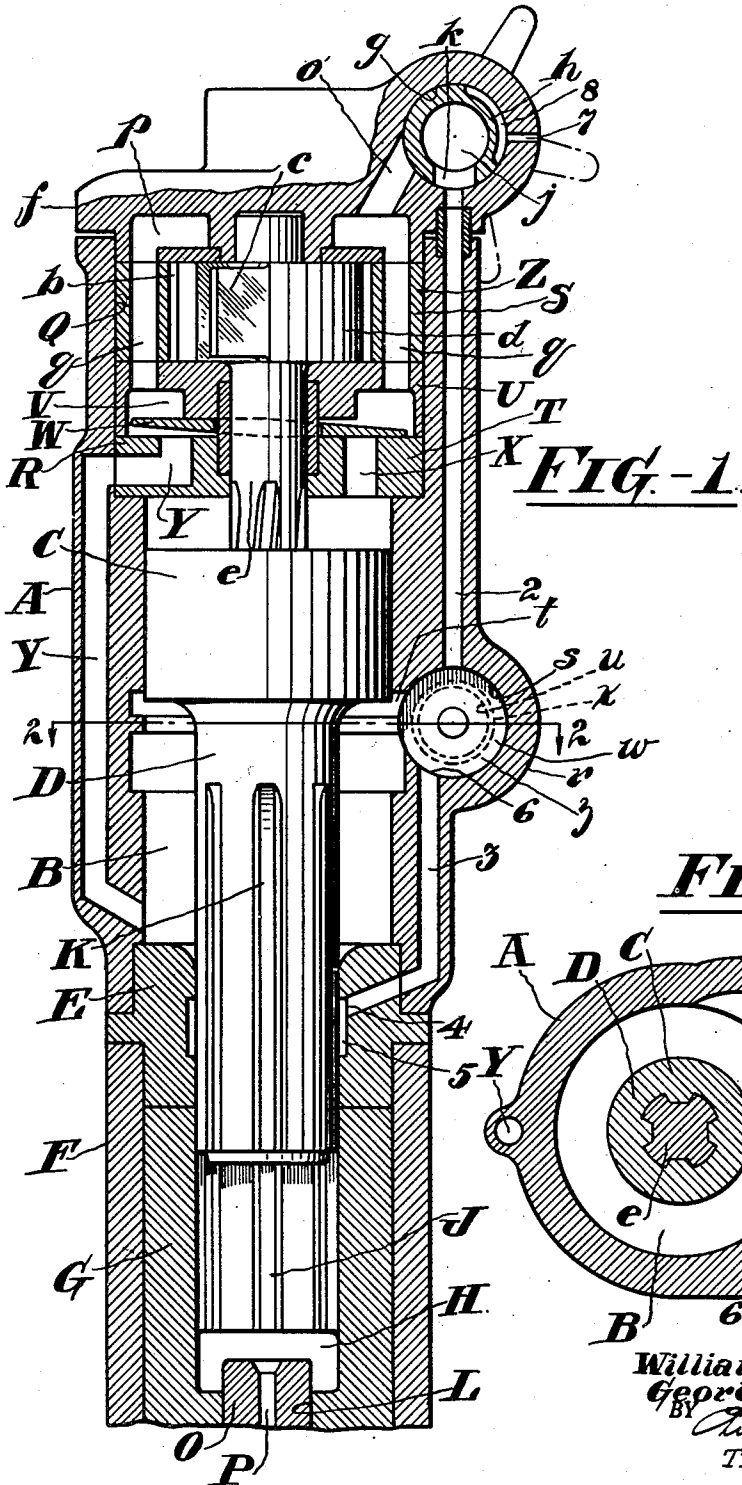
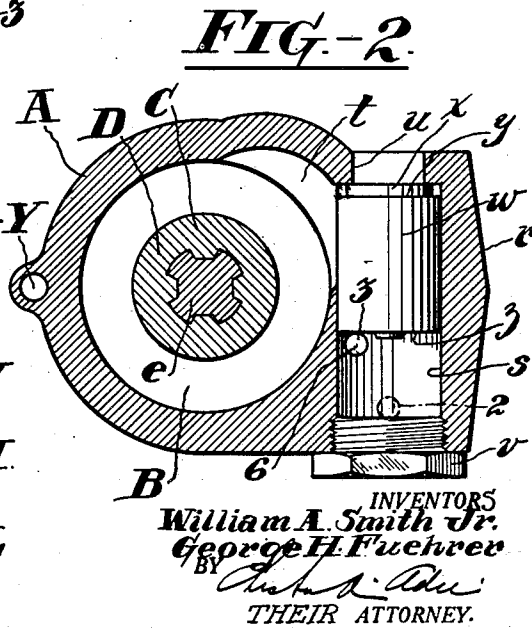
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BLOWING DEVICE FOR ROCK DRILLS

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BLOWING DEVICE FOR ROCK DRILLS

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

One object of the invention is to selectively supply an uninterrupted flow of pressure fluid to the drill hole to remove the cuttings therefrom.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings illustrating the invention and in which similar reference characters refer to similar parts,

Figure 1 is a sectional elevation of a rock drill equipped with a blowing device constructed in accordance with the practice of the invention, and

Figure 2 is a transverse view taken through Figure 1 on the line 2—2 looking in the direction indicated by the arrows.

Referring more particularly to the drawings, A designates a cylinder having a piston chamber B in which is disposed a reciprocatory hammer piston C.

The piston C is provided with a front extension D which is slidably guided by a front cylinder washer E disposed at the front end of the cylinder A to form a closure for that end of the piston chamber B.

The front cylinder washer E also serves to centralize a front head F with respect to the cylinder A.

Within the front head F is a chuck G which may rotate within the front head and is provided with a cavity H to slidably receive the extension D of the piston. A portion of the cavity H is provided with introverted ribs J which interlock with flutes K in the piston extension D.

In the front end of the chuck G is a bore L to receive and guide a working implement O which extends into the cavity H to receive the blows of the hammer piston C. Only the rear or shank end of the working implement O is shown but said working implement may be in the form of a drill steel and accordingly has a bore P therethrough for conveying cleansing fluid from the cavity H to the hole being drilled.

In the rear end of the cylinder A is an

enlarged bore Q to accommodate valve mechanism designated generally by R and rotation mechanism designated generally by S. Preferably the valve mechanism is disposed adjacent the rear end of the piston chamber B. It comprises a pair of plates T and U which form a valve chamber V for a distributing valve W. The plate T forms a closure for the rear end of the piston chamber B and also serves as a seat for the valve W.

Within the plate T are rear and front inlet passages X and Y respectively which are controlled by the valve W. The rear inlet passage X opens directly into the back end of the piston chamber B and the front inlet passage is extended through the cylinder A to the front end of the piston chamber B.

Upon the plate U is seated the rotation mechanism S which includes a ratchet ring Z having the usual introverted teeth *b* to serve as abutments for spring pressed pawls *c* carried by the head *d* of a rifle bar *e*. The rifle bar extends through the valve mechanism into the piston chamber B to interlockingly engage the piston C in a well known manner.

The rotation mechanism S, as well as the valve mechanism R, may be clamped securely in position in the bore Q by a back head *f* seating upon the ratchet ring Z and which may be clamped securely to the cylinder A in any suitable manner.

Within the back head *f* is a bore *g* to accommodate a throttle valve *h* whereby the admission of pressure fluid into the drill is controlled. The throttle valve *h* is preferably of the rotary type having a chamber *j* into which pressure fluid from a suitable source of supply may be constantly introduced. In the wall of the throttle valve *h* is a port *k* which registers with a passage *o* leading to a supply reservoir *p* in the front end of the back head *f*. The supply reservoir *p* communicates with the valve chamber V through supply passages *q* which are formed in the ratchet ring Z and in the plate U.

In drilling apparatus, such as that illustrated, wherein the piston extension is pro-

vided with flutes it is customary to form the flutes of such length that the rear ends thereof will communicate with the front end of the piston chamber during at least a portion of the stroke of the piston. This arrangement will permit a portion of the pressure fluid acting against the front end of the piston to flow through the flutes into the chuck cavity H and thence through the drill steel into the drill hole to blow the cuttings therefrom.

This mode of puff blowing is not under all circumstances sufficient to prevent the accumulation of cuttings in the drill hole. If not removed, the cuttings will be forced rearwardly in the drill hole and will accumulate and form a collar near the cuttings bit which seriously hampers the action of the rotation mechanism whereby the drill steel is intended to be rotated. It is therefore desirable that means be provided to enable the occasional thorough cleansing of the drill hole. The means provided in the present instance for this purpose comprises an enlargement *r* on the cylinder A having a bore therein which forms a blower valve chamber *s*. The blower valve chamber is so arranged that an exhaust port *t* of the cylinder opens thereinto so that the valve chamber *s* forms a portion of the exhaust port which communicates with the atmosphere through a port *u* at one end of the valve chamber *s*.

The opposite end of the valve chamber *s* may be suitably threaded to accommodate a plug *v* which forms a closure for that end of the valve chamber *s*.

Within the blower valve chamber *s* is a reciprocable plug valve *w* which carries a reduced extension *x* adapted to seat over the port *u* to control communication between the piston chamber B and the atmosphere. Near the same end of the valve *w* is a pressure surface *y* against which the exhaust fluid from the piston chamber may act for opening the valve *w* in the absence of pressure fluid in the rear or closed end of the valve chamber *s*. The end of the valve *w* which faces the plug *v* constitutes a pressure surface *z* which may be selectively exposed to pressure fluid for actuating the valve *w* to the closed position.

Pressure fluid utilized for actuating the valve *w* is introduced into the chamber *s* through a supply passage 2 which leads from the bore *g* to the valve chamber *s* into which it opens preferably at a point adjacent the plug *v*.

From the valve chamber *s* leads a blower passage 3 which is located in the cylinder A and in the front cylinder washer E and opens with its outlet end 4 into an annular groove 5 in the front cylinder washer E and encircling the fluted extension D of the piston. The inlet opening 6 of the passage 3 is preferably so located that it will be uncovered by

the valve *w* only in the closed position of the said valve *w*.

In the back head *f* and leading from the bore *g* in an exhaust port 7, and in the periphery of the throttle valve *h* is a groove 8 which is adapted to establish communication between the supply passage 2 and the port 7 for exposing the pressure surface *z* of the valve *w* to atmospheric pressure during the normal operation of the drill and during which time the valve *w* will be in the open position.

The following is a description of the operation of the device: During the normal operation of the drill the throttle valve *h* will occupy a position in which the port *k* registers with the passage *o*. In this position of the throttle valve pressure fluid will flow through the supply reservoir *p* and the supply passages *q* into the valve chamber V where it will be distributed to the ends of the piston chamber B by the distributing valve W. The distributing valve W being of the oscillatory plate type will tilt from one limiting position to the other to cover and uncover the inlet passages X and Y. Upon each admission of pressure fluid to the front end of the piston chamber B for retracting the piston C a portion of the pressure fluid flows through the flutes K and through the cavity H and the bore P into the drill hole to blow the cuttings therefrom.

After the drill steel O has penetrated the work to some considerable depth and at which depth it becomes a difficult matter to maintain the working surface clean so that the cuttings in the drill hole will accumulate, the throttle valve *h* may be rotated to a position wherein the port *k* registers with the supply passage 2. In this way pressure fluid will be admitted into the valve chamber *s* to act against the pressure surface *z* of the valve *w*. The valve *w* will then be actuated to the closed position shown in Figure 2 in which the reduced extension *x* seats over the port *u* thus cutting off communication between the piston chamber B and the atmosphere.

As the valve *w* approaches or reaches its closed position it will uncover the passage 3 and pressure fluid will then flow from the valve chamber *s* through the blower passage 3 into the annular groove 5 where it will enter the flutes K in the piston extension D. From the groove 5 the pressure fluid will flow in both a rearwardly and forwardly direction through the flutes K, that flowing rearwardly will enter the front end of the piston chamber B to act against the front end of the piston C to retract the piston and hold it free from the end of the drill steel O. The pressure fluid flowing downwardly into the cavity H will pass through the bore P in the drill steel and into the drill hole to eject any

detritus which may have accumulated therein.

After the drill hole has been suitably cleansed the throttle valve *h* may be rotated to the position first described and normal drilling may then again be resumed.

When the throttle valve *h* occupies a position for admitting pressure fluid only into the valve chamber *V* the groove 8 will establish communication between the supply passage 2 and the port 7, thus exposing the pressure areas *z* to atmosphere and the valve *w* will then be opened by the exhaust fluid flowing through the exhaust port *t* and acting against the pressure surface *y*. After the valve has been opened such exhaust fluid will not only act against the pressure surface *y* but also against the end of the extension *x* to maintain the valve *w* open.

The present invention has been found to be an extremely efficient device for periodically cleansing the drill hole. It is of simple construction and its operation does not necessitate the manipulation of devices other than that usually employed for controlling the normal operation of the drill.

We claim:

1. In a fluid actuated rock drill, the combination of a cylinder having an exhaust port, a piston in the cylinder normally controlling the exhaust port, a chuck having a cavity, a hollow working implement guided by the chuck and extending into the cavity, a valve chamber in the cylinder, a valve in the valve chamber movable to form a closure for the exhaust port, said valve having a pressure surface exposed to exhaust fluid for moving the valve to open position, means including passages for supplying pressure fluid to the valve chamber to close the valve and to supply pressure fluid to the cavity, and means for controlling the admission of pressure fluid to the passages.

2. In a fluid actuated rock drill, the combination of a cylinder and a piston therein, a valve chamber in the cylinder and forming an exhaust port for the cylinder, a chuck having a cavity, a hollow working implement extending into the cavity, a valve in the valve chamber movable to form a closure for the exhaust port, said valve having a pressure surface exposed to exhaust fluid for moving the valve to open position, a supply passage leading from a source of pressure fluid supply to the valve chamber, a blower passage leading from the valve to the cavity and adapted to be uncovered by the valve in the closed position of said valve, means movable into one position for controlling the admission of pressure fluid into the supply passage to close the valve and to supply pressure fluid to the working implement, and an exhaust port controlled by said means and adapted to communicate with the supply passage in another position of said means, whereby pres-

sure fluid will be exhausted from the supply passage and exhaust fluid from the cylinder will actuate the valve to open position.

3. In a fluid actuated rock drill, the combination of a cylinder having an exhaust port and a piston in the cylinder, a hollow working implement, a chuck to guide the working implement and having a cavity, a valve chamber forming a part of the exhaust port, a valve in the valve chamber movable to form a closure for the exhaust port, said valve having a pressure surface exposed to exhaust fluid for moving the valve to open position, a supply passage leading from a source of pressure fluid supply to the valve chamber, a blower passage leading from the valve chamber to the cavity, means movable into one position for controlling the supply passage to admit pressure fluid into the valve chamber to actuate the valve into position for closing the exhaust port and to supply pressure fluid to the working implement, and an exhaust port controlled by said means and adapted to communicate with the supply passage in another position of said means, whereby pressure fluid will be exhausted from the supply passage and exhaust fluid from the cylinder will actuate the valve to open position.

4. In a fluid actuated rock drill, the combination of a cylinder having an exhaust port and a piston in the cylinder, a hollow working implement, a chuck to guide the working implement and having a cavity into which the working implement extends, a valve chamber communicating with the exhaust port and through which exhaust fluid from the cylinder passes, a valve in the valve chamber movable to form a closure for the exhaust port, said valve having a pressure surface exposed to exhaust fluid for moving the valve to open position, a supply passage leading from a source of pressure fluid supply to the valve chamber, a blower passage leading from the valve chamber to the cavity, a throttle valve movable to one position for controlling the supply passage to admit pressure fluid to the valve chamber to hold the first said valve closed and to supply pressure fluid to the cavity, and an exhaust port controlled by said throttle valve and adapted to communicate with the supply passage in another position of said throttle valve, whereby pressure fluid will be exhausted from the supply passage and exhaust fluid from the cylinder will actuate the valve to open position.

5. In a fluid actuated rock drill, the combination of a cylinder having an exhaust port and a piston in the cylinder, a hollow working implement, a chuck to guide the working implement and having a cavity into which the working implement extends, a valve chamber communicating with the exhaust port and through which exhaust fluid flows

from the exhaust port, a reciprocable valve in the valve chamber to control the exhaust port, said valve having a pressure surface and being normally held open by the exhaust fluid issuing from the cylinder and acting against said pressure surface, a supply passage for supplying pressure fluid to the valve chamber, a blower passage leading from the valve chamber to the cavity, a throttle valve movable to one position for controlling the supply passage to admit pressure fluid into the valve chamber to hold the first said valve closed and to supply pressure fluid to the cavity, and an exhaust port controlled by said throttle valve and adapted to communicate with the supply passage in another position of said throttle valve, whereby pressure fluid will be exhausted from the supply passage and exhaust fluid from the cylinder will actuate the valve to open position.

6. In a fluid actuated rock drill, the combination of a cylinder having an exhaust port and a piston in the cylinder, an extension on the piston having flutes therein, a chuck having a cavity to receive the extension, a hollow working implement guided by the chuck and extending into the cavity, a valve chamber communicating with the exhaust port and through which the exhaust fluid flows from the exhaust port, a reciprocable valve in the valve chamber to control the exhaust port and having a pressure surface against which exhaust fluid acts for maintaining said valve normally open, a supply passage for supplying pressure fluid to the valve chamber, a blower passage leading from the valve chamber to the cavity, a throttle valve movable to one position for controlling the supply passage to admit pressure fluid into the valve chamber for holding the first said valve closed and to supply pressure fluid through the flutes to the cavity, and an exhaust port controlled by said throttle valve and adapted to communicate with the supply passage in another position of said throttle valve, whereby pressure fluid will be exhausted from the supply passage and exhaust fluid from the cylinder will actuate the valve to open position.

In testimony whereof we have signed this specification.

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