

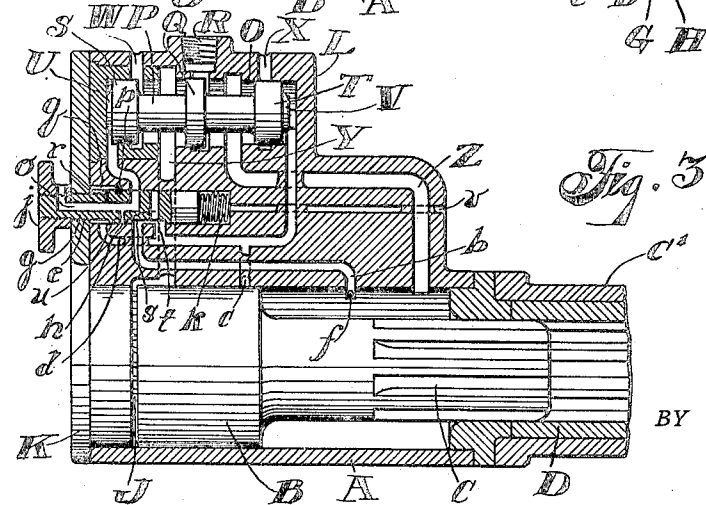
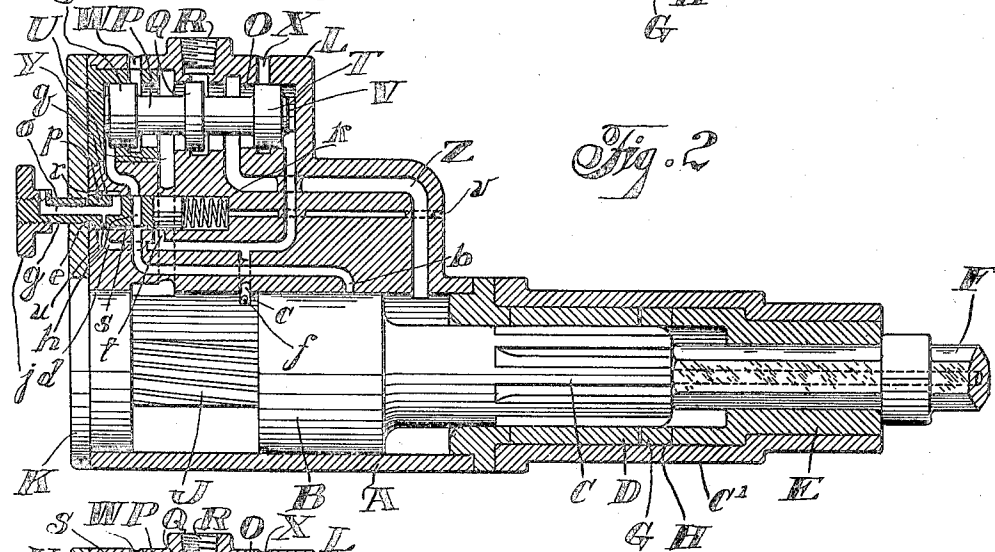
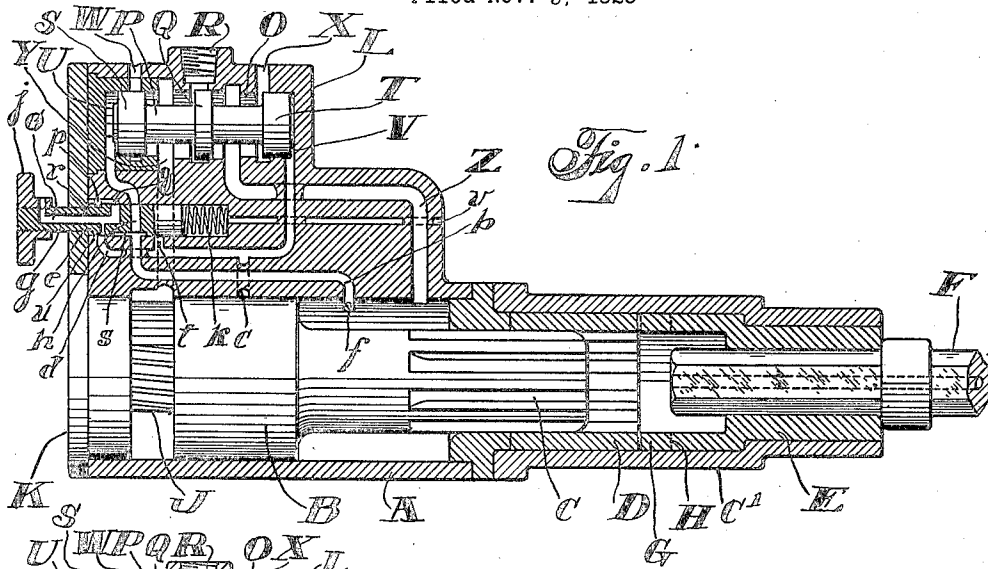
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W. A. SMITH, JR

BLOWING DEVICE

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UNITED STATES PATENT OFFICE.

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BLOWING DEVICE.

Application filed November 3, 1925. Serial No. 66,485.

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

5 The objects of the invention are to selectively admit pressure fluid under full line pressure to the drill steel for cleansing the drill hole and to prevent reciprocation of the valve and the piston during the time such
10 pressure fluid is passing through the drill steel.

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

15 The invention consists of the combination of elements, features of construction and arrangement of parts having the general mode of operation substantially as hereinafter described and more particularly pointed out in the appended claims and illustrated in the
20 accompanying drawings, in which—

Figure 1 is a longitudinal view, partly in section, of a rock drill equipped with a blowing device constructed in accordance with the present invention and showing the valve
25 and the piston in one position,

Figure 2 is a view similar to Figure 1 showing the valve and the piston in another position, and

Figure 3 is a view similar to Figures 1 and 2 illustrating the manner in which communication may be established between the kicker ports which lead from the cylinder to the ends of the valve chamber.

Referring to the drawings the invention is shown embodied in a rock drill having a cylinder A provided with a hammer piston B. The hammer piston B in this instance has a reduced forward extension or nose C fluted for a portion of its length to engage a similarly fluted chuck nut D rotatable within a front head C'. The front head C' may be secured to the front end of the cylinder A in any suitable and convenient manner, as for instance, side bolts (not shown). Within
45 the front head C' is a chuck E bored at its outer end to receive a hollow hexagonal drill steel F, the shank end of which extends into the path of the hammer piston B to receive the blows of said piston. In order to prevent
50 relative rotation between the chuck nut D and the chuck E, the adjacent or abutting faces of the chuck nut and said chuck are provided with interlocking portions G and H respectively.

In order to impart a rotary movement to 55 the hammer piston B during one of its strokes, preferably during the rearward stroke, for keeping the drill steel F free within the drill hole, a rifle bar J extends through a back cylinder washer K to engage 60 the piston B in the usual manner. The means for holding the rifle bar J immovable during one stroke of the piston and for permitting rotation of said rifle bar during the opposite stroke of the piston are not shown, 65 but such means may consist of the usual ratchet and pawl devices.

In the present instance, the back cylinder washer K is formed to extend across the rearward end of a valve chest L, and which 70 chest is preferably formed integrally with the cylinder A as shown in the drawings, although said chest may be formed transversely with respect to the cylinder, if desired. 75

Within the valve chest L is formed a valve chamber O to receive a distributing valve P. The distributing valve P may be of any suitable type, as the invention is not dependent upon the particular valve illustrated for its 80 successful functioning, and the invention may be used in connection with any type of valve which controls both the admission of pressure fluid to the cylinder and the exhaust of pressure fluid therefrom. The valve 85 P in this instance has a central head Q for controlling the admission of pressure fluid through an inlet R into the valve chamber O and has outer end heads S and T having actuating faces U and V against which pressure fluid may act for actuating the valve 90 from one limiting position to the other limiting position. In addition to serving as a means for actuating the valve V, the heads S and T also control the free exhaust ports 95 W and X respectively leading from the valve chamber O to the atmosphere. Pressure fluid admitted into the chamber O may pass to the rearward and front ends of the cylinder A through supply passages Y and 100 Z respectively. In this instance the supply passages Y and Z also serve as exhaust passages for exhausting the pressure fluid from the cylinder.

Usually in drills employing the type of 105 valve herein described, kicker ports are employed for admitting pressure fluid from the cylinder to act against the actuating faces

of the valve. Such kicker ports may be crossed as in the present instance, in which a kicker port *b* leading from a point between the central portion of the cylinder A and the supply port Z extends to the rearward end of the valve chamber O and is controlled by the hammer piston B. A second kicker port *c* communicating with the cylinder A rearwardly of its center is formed to extend to the front end of the valve chamber O and has a branch port *d* leading rearwardly to a bore *e* formed between the valve chamber O and the cylinder A.

At the point of communication between the ports *b* and *c* and the cylinder A are formed vents *f* leading from the cylinder to the atmosphere. The vents *f* are preferably of considerably smaller cross sectional area than the ports *b* and *c* and serve as cushion relief ports for the ends of the valve chamber O.

According to the present invention a blower valve *g* is arranged slidably in the bore *e* and has a transverse passage *h* which in the normal position of the blower valve *g* forms a part of the kicker port *b*. The outer end of the valve *g* is preferably screw threaded to receive a button *j* against which the attendant may press for actuating the valve. In the inner end of the bore *e* is placed a spring *k* to act against the end of the valve *g* for holding said valve in its normal position as indicated in Figures 1 and 2. A relief passage *o* formed through the valve *g* is in constant communication with the atmosphere at one end and may be actuated into registration at its other end with the kicker port *b*.

Any suitable means may be employed for holding the valve *g* against rotative movement. In this instance said valve carries a stop *p* adapted to slide through a slot *q* formed in the bore *e*. Outward movement of the valve *g* is in this instance limited by a shoulder *r* to abut against the back cylinder washer K.

To the end that communication may be established between the kicker ports *b* and *c*, a recess *s* is formed on the valve *g*. The recess *s* is so positioned that in the normal position of the valve *g* it extends only across the port *b*, but when the valve *g* is pressed inwardly through the bore *e*, said recess will extend across the port *b* and also across a port *t* which provides communication between the bore *e* and the branch port *d*. In order to more fully prevent the formation of an air cushion in the front end of the valve chamber O, a port *u* may be formed in the valve *g* to communicate at one end with the passage *o* in the valve and at its other end with the branch port *d* when said valve is in its normal or retracted position, and for like reasons, a passage or vent *v* is formed through the valve chest L for venting the

bore *e* to the atmosphere. The port *u* is preferably of rather small cross sectional area and may be closed if desired since as before stated, the formation of an air cushion in the ends of a valve chamber O is prevented by the small vents *f*. As will be observed, the vents *f* are so positioned that they will not be uncovered until the piston nears the end of its stroke in both directions and are of such an area that the amount of pressure fluid permitted to escape therethrough from the time these vents are uncovered until the piston reaches the limit of its stroke is negligible.

During the normal operation of the drill, a certain small portion of the pressure fluid entering the front end of the cylinder passes along the fluted extension of the piston nose C through the drill steel F into the drill hole and to some extent serves to remove or blow out some of the dust or cuttings from the drill hole. Owing to the short duration of such blowing and the consequent small amount of pressure fluid thus admitted to the drill hole, a considerable accumulation of cuttings is formed rearwardly of the cutting bit of the drill steel. Such cuttings if not removed will greatly retard the action of the drill and in time will form a cushion of cuttings beneath the drill bit so that instead of cutting on a fresh or clean rock face, the drill will strike against the cuttings. In order to prevent this objectionable condition, the attendant may press the blower valve into the position shown in Figure 3. In this position of the blower valve, the recess *s* will establish communication between the kicker port *b* and port *t*. In this way a path is provided for pressure fluid to pass from the front end of the cylinder through said kicker port *b* and port *t* thence through the branch port *d* and the kicker port *c* into the front end of the valve chamber O and move the valve rearwardly and hold said valve in rearward position until the blower valve is again released. With the valve P held in its rearward position as described, pressure fluid entering the valve chamber O will pass only through the port Z to the front end of the cylinder and will therefore actuate the piston B rearwardly to its rearward limiting position and hold said piston in this position until the valve P is again allowed to reciprocate. When the piston B is withdrawn for a sufficient distance so that the flutes on the nose C extend into the front end of the cylinder A, pressure fluid in the front end of the cylinder under full line pressure will flow through said flutes and through the drill steel F into the drill hole and thoroughly cleanse the drill hole. After the drill hole has been thoroughly cleansed, the valve *g* may be released and the drill will again proceed to function in its normal manner.

I claim:

1. In a blowing device for a fluid actuated rock drill, the combination of a cylinder, a hammer piston in the cylinder having flutes on its forward extension, a valve chest on the cylinder, a valve in the chest, supply passages for admitting pressure fluid from the chest to the cylinder, a pair of kicker ports for admitting pressure fluid from the cylinder to the chest for actuating the valve, and means for establishing communication between the kicker ports, thereby directing pressure fluid to corresponding ends of the valve chest and the cylinder for holding the valve and the piston immovable in the opposite end of said chest and said cylinder thus permitting the escape of pressure fluid from the opposite end of the cylinder past the flutes on the forward extension of the piston to the drill steel.

2. In a blowing device for a fluid actuated rock drill, the combination of a cylinder, a hammer piston in the cylinder having a fluted forward extension, a front head for the cylinder, a hollow drill steel extending into the front head to receive the blows of the hammer piston, a valve chest on the cylinder, supply passages and kicker ports leading from the chest to the cylinder, a valve in said valve chest for controlling said passages and ports, and reciprocating means for admitting pressure fluid from one kicker port to another kicker port for holding the valve and the piston immovable in corresponding ends of the valve chest and the cylinder thereby permitting the passage of pressure fluid from the valve chest through the cylinder and past the flutes on the piston to the drill steel.

3. In a blowing device for a fluid actuated rock drill, the combination of a cylinder, a hammer piston in the cylinder having a fluted forward extension, a front head for the cylinder, a hollow drill steel extending into the front head to receive the blows of

the hammer piston, a valve chest on the cylinder, supply passages and kicker ports leading from the chest to the cylinder, a valve in said valve chest for controlling said passages and ports, and a blower valve to establish communication between the kicker ports thereby admitting pressure fluid to only one end of the valve chest to hold the valve immovable in the opposite end of said chest and admitting pressure fluid to only one end of the cylinder for holding the piston immovable in the opposite end of said cylinder and for permitting the passage of pressure fluid from the valve chest through one of the supply passages and past the flutes on the piston to the drill steel.

4. In a blowing device for a fluid actuated rock drill, the combination of a cylinder, a hammer piston to reciprocate in the cylinder having a fluted forward extension, a front head for the cylinder, a hollow drill steel in the front head to receive the blows of the hammer piston, a valve chest on the cylinder, a valve in the chest for distributing pressure fluid to the cylinder, supply passages for admitting pressure fluid from the chest to the ends of the cylinder, a pair of kicker ports to admit pressure fluid from the cylinder to the valve chest for actuating the valve, and a blower valve for preventing communication between the cylinder and one end of the valve chest and for establishing communication between the kicker ports thereby permitting pressure fluid to pass from one kicker port into the other kicker port to hold the valve and the piston immovable in the rear end of the valve chest and the cylinder for permitting the passage of pressure fluid from the valve chest through the cylinder and past the flutes on the piston to the drill steel.

In testimony whereof I have signed this specification.

WILLIAM A. SMITH, JR.