

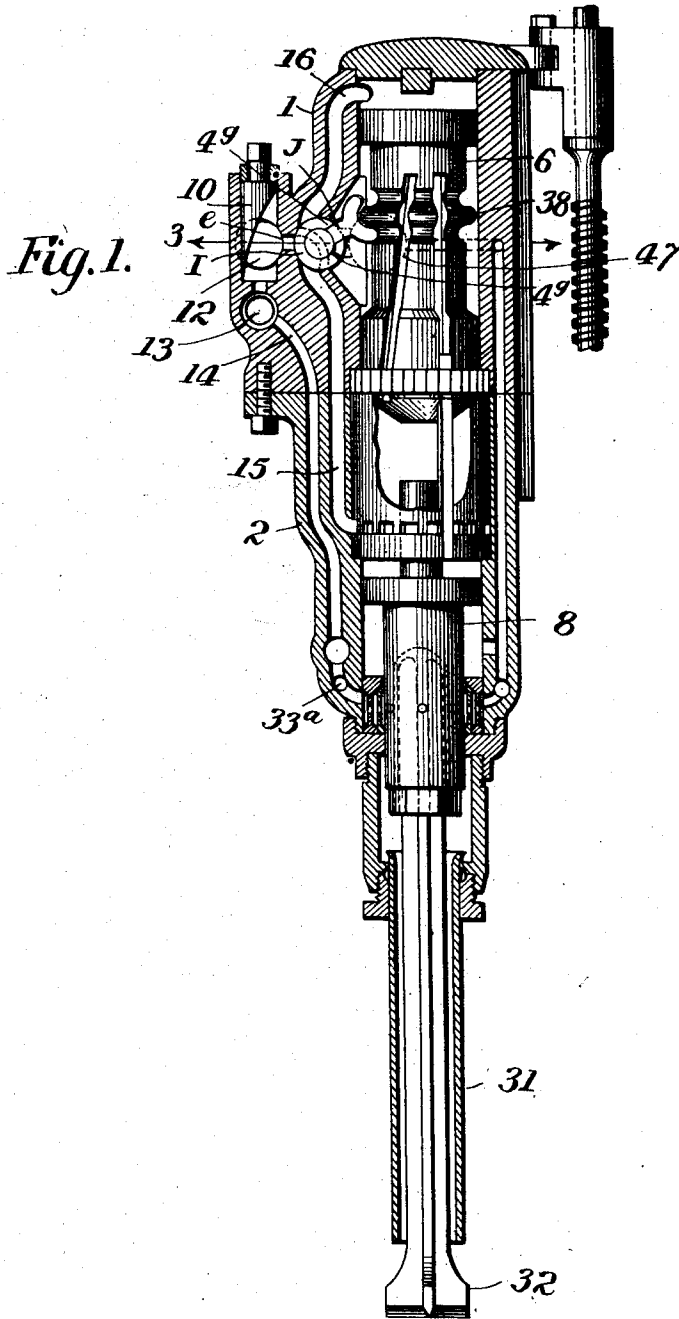
No. 826,456.

PATENTED JULY 17, 1906.

C. M. WALKER.
ENGINE FOR ROCK DRILLING MACHINES.

APPLICATION FILED APR. 1, 1905.

2 SHEETS—SHEET 1.



Witnesses

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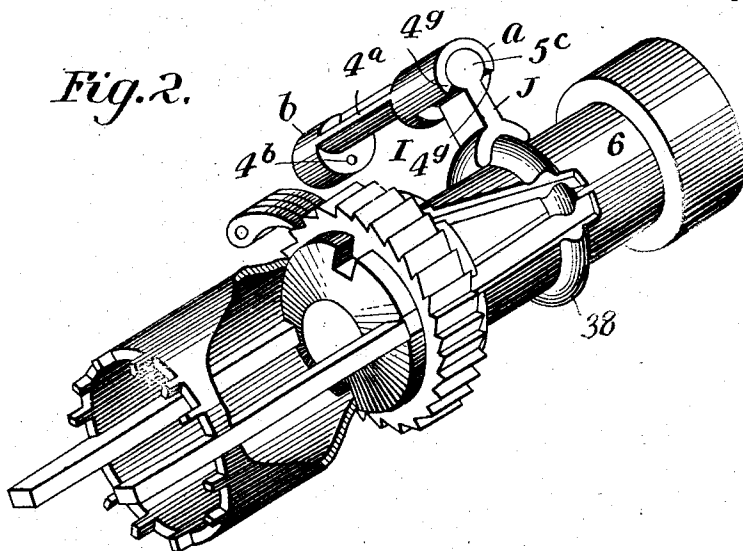
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ENGINE FOR ROCK DRILLING MACHINES.

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2 SHEETS—SHEET 2.

Fig. 2.



UNITED STATES PATENT OFFICE.

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ENGINE FOR ROCK-DRILLING MACHINES.

No. 826,456.

Specification of Letters Patent.

Patented July 17, 1906.

Original application filed November 28, 1904, Serial No. 234,608. Divided and this application filed April 1, 1905. Serial No. 253,301.

To all whom it may concern:

Be it known that I, CASSIUS M. WALKER, a citizen of the United States, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Engines for Rock-Drilling Machines, of which the following is a specification.

My invention relates to valve devices, and more especially to valve devices of a character adapting them to a rock-drill or other structure in which there is a reciprocating member, such as a hammer or piston; and my invention consists in the construction and arrangement of the valve and its operating means, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a rock-drill provided with my improvements; Fig. 2, a perspective view showing the construction of the valve and its connections with the operating piston or hammer. Fig. 3 is a transverse section on the line 3-3, Fig. 1. Figs. 4 and 5 are views illustrating the different positions of the valve.

My improvements may be used in connection with drilling apparatus of different constructions; but I have illustrated the same and will describe the operation in connection with the construction of apparatus set forth in an application of which this is a division, filed November 28, 1904, Serial No. 234,608. It will not be necessary to describe in detail the features of said apparatus, except to specify that there is a cylinder or casing consisting of two connected sections 1-2, a hammer 6, reciprocating in the said casing and acting against the head of the chuck 8, sliding through a packed opening at one end of the casing and supporting the drill 32, which is surrounded by a tube 31, that serves to conduct a fluid under pressure to the cutting end of the drill. The cylinder contains ports 15 and 16, leading from the chamber of the valve I, the said chamber also communicating with an exhaust-port 12, and the latter communicates, through a channel or passage 14, with ports leading through openings in the gland to the tube 31. The channel 14 communicates with a port 13, which may be put in communication with a second port 33^a in said channel through the medium of means

whereby the escape of a fluid from the port 13 may be the means of carrying a liquid to the port 33^a and to the tube 31. The features above described may be constructed and combined to operate in any suitable manner in connection with the improved valve and valve-operating devices, which I will now describe.

The valve I has two heads *a b*, connected by a curved web 4^a, arranged above or beyond the axis of the valve, the latter preferably tapering and shorter than the socket in the casing, which socket communicates with an inlet-port 47, leading to the space between the two heads of the valve, and an opening 4^b in the outer head of the valve permits the motor fluid to pass into the chamber *x* between said head and the end of the socket, exerting a pressure tending to maintain the valve in its seat. A screw-plug 4^d, closing the larger end of the socket, permits the insertion and removal of the valve.

The valve may be shifted to the two positions shown in Figs. 4 and 5 to direct the motor fluid to the opposite ends of the cylinder, respectively, and alternating from said ends to the port *e*, leading to the exhaust-port 12.

The valve is rocked from the reciprocating hammer 6 through the medium of a rock-arm J so engaging the hammer that its inner end will be reciprocated thereby. As shown, the said end is forked to engage a rib 38 upon the hammer.

It is desirable that after the valve is set to direct the flow of fluid to carry the hammer in one direction it shall remain in this position until the hammer nearly reaches the limit of its movement in said direction and that the valve shall then be suddenly shifted. I effect this result by providing contact-shoulders upon the valve so arranged that the arm J shall only contact with the same just as the hammer completes its movement. While different constructions may be used for this purpose, I have shown the valve as having a socket in its inner head adapted to receive the cylindrical head 5^c of the arm J and cut away so as to leave widely-separated shoulders 4^e 4^g, whereby the arm can have an extended play independently of the valve and will only come in contact with the shoulder as the arm completes its movement in one direction or the other.

In order to avoid that wear which would result from an extended rocking movement of the valve, I have arranged the ports 15 and 16 upon a plane at one side of the axis of the valve and on that side nearest the exhaust-port and have provided the valve with the web 4^a, curved, as shown, so that a rocking movement of about one-eighth of a complete revolution is sufficient to carry the valve between its extreme positions. Further, by providing the valve with a web between two heads and admitting the pressure to the space between said heads the tendency is to lift the valve and compensate for the pressure that it would otherwise exert downward upon its seat, while the pressure in the chamber *x* tends to hold it to its seat in the tapering socket.

When it is desired to utilize the exhaust for any purpose, it may be directed to a greater or less extent into the channel 14 or into a port 13, communicating with said channel, by means of a tapering valve 10, which extends into a chamber transverse to the exhaust-port 12 and communicating with the port 13. The valve 10 is of such a shape that it may be turned to close the exhaust-port to a greater or less extent, as desired.

I do not here claim the features shown and also claimed in my aforesaid application Serial No. 234,608.

Without limiting myself to the precise construction and arrangement shown or to the use of the parts in connection with any special form of drilling apparatus, I claim as my invention—

1. The combination with the cylinder of a rock-drilling machine and with its ports and tapering valve-socket closed at each end, of a tapering valve fitted to said socket, provided with two heads and an intervening web, the ports communicating with the space between the heads, a chamber beyond the larger head of the valve, a port in said head, a socket in

the smaller head with separated shoulders below the same, and an arm with a head fitted to said socket and extending between the shoulders to have a limited motion independently of the valve for rocking the latter, substantially as set forth.

2. The combination with the hammer and valve-socket of a rock-drill, of a valve adapted to said socket and provided at one end with a longitudinal socket with separated bearing-faces, and an arm having a head adapted to the socket in the valve and extending between said faces and engaging the hammer, substantially as set forth.

3. The combination in a rock-drill, of a reciprocating hammer having an annular rib, a rock-valve, an actuating-arm for said valve pivoted to have a limited movement independent thereof and forked at the end and engaging the rib of the hammer, substantially as set forth.

4. The combination in a rock-drill, of the casing having a valve-socket, a detachable plug closing the outer end of said socket, a hammer reciprocating in the casing, a rock-valve fitted to said socket, and an arm having a head fitting a longitudinal socket at one end of the valve and engaging the hammer, substantially as set forth.

5. In a rock-drilling machine, the combination with a cylinder, hammer reciprocating therein, and ports supplying pressure thereto, of a valve controlling the ports, and an arm loosely connected to the valve at one end thereof and having a forked end adapted to be engaged by the hammer, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CASSIUS M. WALKER.

Witnesses:

WM. L. HARTMAN,
E. M. PLEAS.