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DISTRIBUTING VALVE FOR PERCUSSIVE ROCK DRILLING MACHINES.

APPLICATION FILED MAR. 21, 1907.

910,447. Patented Jan. 19, 1909.

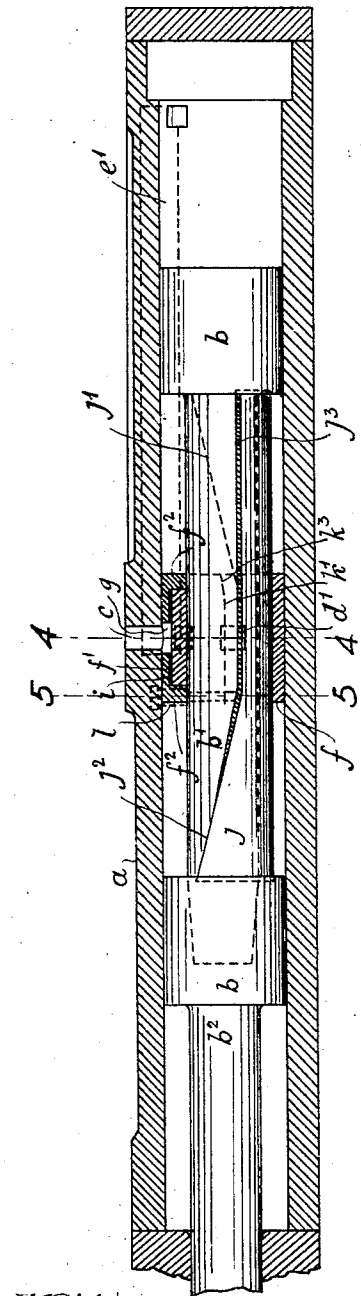


Fig. 1.

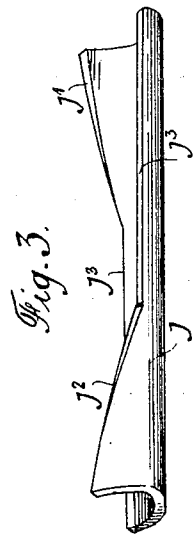


Fig. 3.

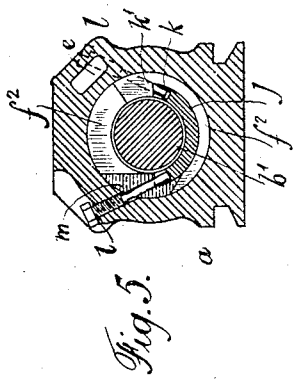


Fig. 5.

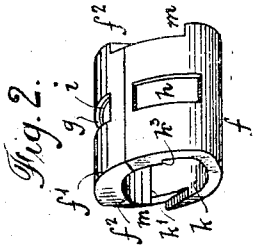


Fig. 2.

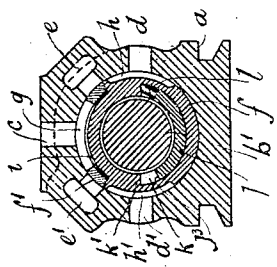


Fig. 4.

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UNITED STATES PATENT OFFICE.

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DISTRIBUTING-VALVE FOR PERCUSSIVE ROCK-DRILLING MACHINES.

No. 910,447. Specification of Letters Patent. Patented Jan. 19, 1909.

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To all whom it may concern:

Be it known that we, ANTHONY JOHN BANT and HENRY GULLETT, British subjects, both residing at the City and Suburban Gold Mining Company, Limited, Johannesburg, in the Colony of the Transvaal, have invented certain new and useful Improvements Relating to Distributing-Valves for Percussive Rock-Drilling Machines and other Reciprocating Engines, of which the following is a specification.

The present invention relates to reciprocating engines such as percussive rock drilling machines and particularly to the means for distributing the actuating fluid therein; the object being to provide a novel distributing device having the valve contained within the cylinder, which device is of very simple construction and permits the production of a machine of especial lightness and handiness.

The invention provides for a cylindrical or partly cylindrical valve fitting the bore of the cylinder, usually between the piston heads, means associating the valve and the piston such that the linear reciprocation of the latter causes a rotational oscillation of the former; and an arrangement of corresponding ports in the valve and cylinder whereby the valve is enabled in the course of its oscillations to distribute the working fluid as required to produce reciprocation of the piston.

Subsidiary features of the invention will be mentioned in the following description of one form of the invention as embodied in a percussive drilling machine; reference being had to the accompanying drawings, in which—

Figure I is a longitudinal vertical section through the machine; Fig. II a perspective view of the valve, Fig. III a perspective view of the valve actuating member hereinafter described; and Figs. IV and V transverse sections taken respectively upon the planes 4, 4 and 5, 5, Fig. I, and viewed from the front of the machine.

a indicates the cylinder, within which works a piston of the common form, *i. e.* comprising two heads *b*. *b* connected by a shank b^1 and having projecting from it the piston rod b^2 which carries the tool.

c is the inlet port for live fluid; *d*, d^1 eduction ports formed through the cylinder walls for discharging the exhaust from the cylinder; *e*, e^1 the ports for conducting the actuating fluid between the valve and the cylinder ends. The valve *f* is in this instance shaped as a complete annulus and fits accurately in the central portion of the bore of the cylinder between the piston heads, such heads being made separable in any convenient manner to permit the valve to be placed between them. Around the periphery of the valve are sunk the port *g* for connecting the inlet *c* to either of the ports *e*, e^1, and the ports *h*, h^1 for connecting said ports *e*, e^1 to their respective exhaust ports *d*, d^1.

To insure tightness of the valve to fluid, and to prevent undue freedom of its movement, the upper portion of its periphery, *i. e.* the part adjacent to the cylinder ports, is made separate from the remainder as indicated by f^1 in the drawings. Such portion f^1 is sunk into a corresponding recess in the valve body and carries end flanges f^2 which embrace the body; a resilient packing *i*, such as a piece of insertion, is interposed between the piece f^1 and the bottom of the recess in which it lies. It will be seen that the separable piece can only move radially with respect to the body of the valve; the packing *i* and fluid pressure acting under it keep it resiliently pressed against the cylinder walls and the packing *i* also forms a tight joint between the two parts of the valve.

Rotational oscillation of the valve is effected by the valve actuating member *j* shown separately in Fig. III; such member being fitted between the piston heads to receive longitudinal motion therefrom and being supported by its extremities fitting into annular recesses in the inner faces of the heads so as to permit free relative rotation between it and the piston. Such member passes through the valve *f* in a semi-annular internal recess *k* formed for that purpose.

At either end of the member *j* and at opposite sides thereof are formed helical faces j^1, j^2 which as the member *j* is reciprocated longitudinally engage alternately with the shoulders k^1 of the recess *k* in the valve and bring about the desired rotational oscillation of the valve; one extremity k^3 of each of such shoulders k^1 being beveled off to provide a suitable contact surface for the corresponding helix. The edges j^3 of the member *j* are continued from the helical portions parallel with the axis and diametrical with the highest part of the opposite

helices, so that as the valve is thrown fully over in either direction it is prevented from moving too far by coming into contact with one or other of the edges j^3.

In machines of the class in question the piston is usually caused to rotate during working, and means are therefore provided to preclude rotation of the member j, such means serving also in the present instance to confine the valve against axial displacement, and also to permit its being adjusted or set with respect to the cylinder ports.

1, 1 are set screws passing through the cylinder walls and making contact at their extremities with the edges j^3 of the member j, which is thereby prevented from rotating. Such screws are disposed one at each end of the valve and in contact therewith and thus form stops to prevent its axial displacement; recesses m being in the present instance cut in either face of the valve to receive the screws. By suitably manipulating the screws, the member j, and with it the valve, may be adjusted relatively to the cylinder ports as required in setting the valve. It will be evident that such adjustability of the valve permits the amount of fluid passed to either end of the cylinder to be regulated as desired; for example, it may be arranged that less fluid is supplied on the backward stroke than that on the working stroke.

In operation, the piston being at the front of the cylinder, helix j^1 has rotated the valve to put ports c and e into communication by the valve port g and port e^1 open to exhaust through the valve port h^1. Fluid now enters the front cylinder and drives back the piston, by which movement helix j^2 is brought into contact with the valve and throws the same over to connect port e^1 with inlet c and open port e to exhaust. The piston now makes its forward stroke and the cycle is repeated.

We claim as our invention:—

1. In an engine, the combination of a cylinder provided with ingress and egress ports, a piston for said cylinder, fluid distributing means located in said cylinder for controlling ingress and egress of pressure fluid through said ports, a device associated with said piston for operating said means, and adjustable mechanism limiting movement of said means and controlling the operation of said device.

2. In an engine, the combination of a cylinder provided with ingress and egress ports, a piston for said cylinder, fluid distributing means located in said cylinder for controlling ingress and egress of pressure fluid through said ports, a device associated with said piston for operating said means, and adjustable mechanism for controlling the position of said device.

3. In an engine, the combination of a cylinder provided with ingress and egress ports, a piston for operating said cylinder, fluid distributing means located in said cylinder for controlling ingress and egress of pressure fluid through said ports, a device loosely mounted on said piston for operating said means, and adjustable mechanism for mantaining said device in a prescribed position.

4. In an engine, the combination of a cylinder provided with ingress and egress ports, a piston for said cylinder, fluid distributing means located in said cylinder for controlling ingress and egress of pressure fluid through said ports, a device loosely mounted on said cylinder for operating said means, and fixedly mounted adjustable mechanism for maintaining said device in a prescribed position.

5. In an engine, the combination of a cylinder, a rotatable reciprocatory piston for said cylinder, an oscillating distributing valve in said cylinder, a valve actuating member reciprocated by said piston and provided with opposed cam surfaces engaging said valve to oscillate the same, said member being independently rotatable with respect to said piston, and means for preventing rotation of said valve actuating member.

6. In an engine, the combination of a cylinder, a rotatable reciprocatory piston for said cylinder, a hollow oscillating distributing valve in said cylinder, and a semi-cylindrical valve actuating member mounted on said piston and extending through said valve, said actuating member having cam surfaces for oscillating said valve.

7. In an engine, the combination of a cylinder, a rotatable reciprocating piston therefor, an oscillatory distributing valve mounted in said cylinder, means located in said cylinder for oscillating said valve, and set screws passing through the cylinder walls and engaging said valve to prevent reciprocation thereof.

8. In an engine, the combination of a cylinder, of a reciprocating piston therefor, an oscillatory distributing valve located in said cylinder, means movably mounted on said piston for oscillating said valve, and means preventing reciprocation of said valve and engaging said first mentioned means to prevent movement thereof and to effect adjustment of said valve.

9. In a reciprocating engine, the combination of a cylinder provided with ports, a distributing valve fitted in said cylinder and composed of a main body portion and a separate peripheral portion, said peripheral portion lying against said ports and being movable radially outwardly, and means whereby said peripheral portion is caused to move outwardly against said cylinder.

10. In a reciprocating engine, the com-

bination of a cylinder provided with ports, a distributing valve fitted in said cylinder and composed of a main body portion recessed peripherally, and a peripheral portion fitted in said recess lying flush with the periphery of said body portion, and a resilient packing interposed between said body and peripheral portions pressing the latter against said cylinder.

11. In a reciprocating engine, the combination with a cylinder provided with ports, a distributing valve fitted in said cylinder and composed of a main body portion provided with a peripheral recess and end recesses, a peripheral portion seated in said peripheral recess and overhanging said end recesses and lying flush with the peripheral and end portions of the valve, and a resilient packing interposed between said body and peripheral portions for pressing the latter against the cylinder.

In testimony whereof we affix our signatures in presence of two witnesses.

ANTHONY JOHN BANT.
HENRY GULLETT.

Witnesses:
JAMES BENTLY,
ALFRED L. SPOOR.