No. 684,307. Patented Oct. 8, 1901.

P. H. REARDON.

ENGINE FOR ROCK DRILLS.

(Application filed Mar. 29, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

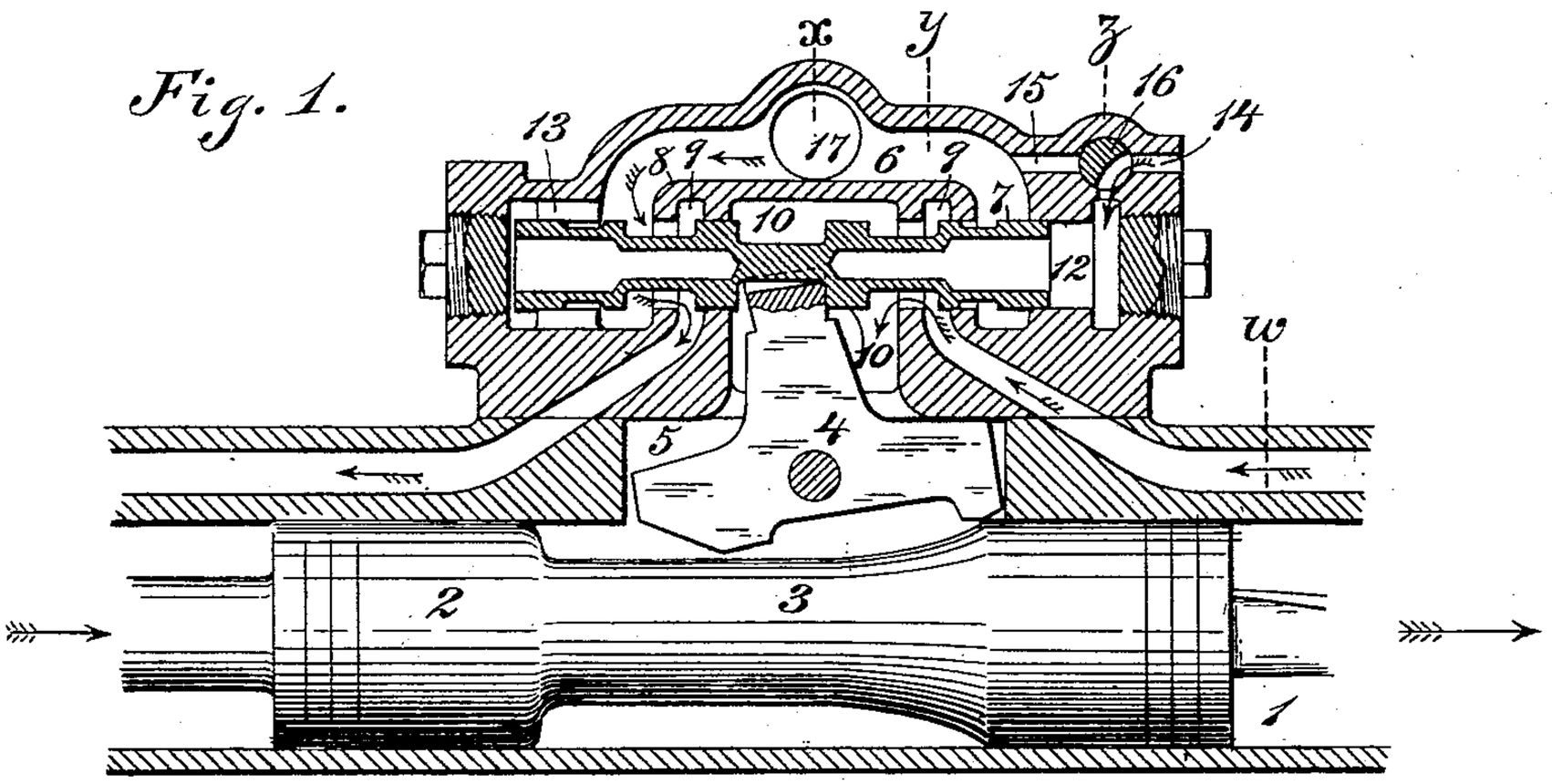

Fig. 2.

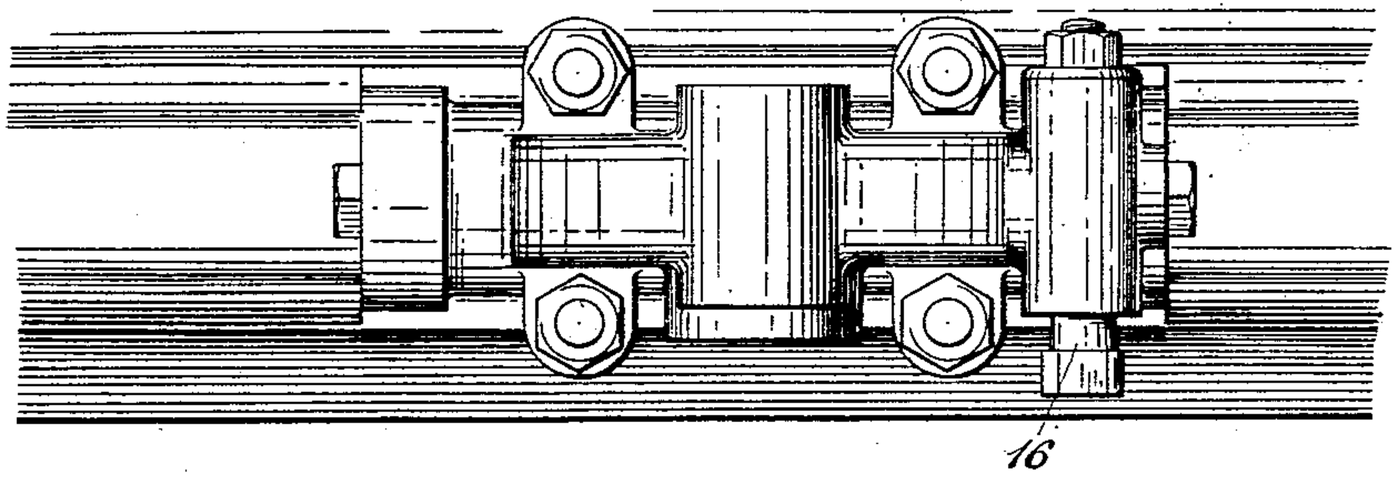

Fig. 3.

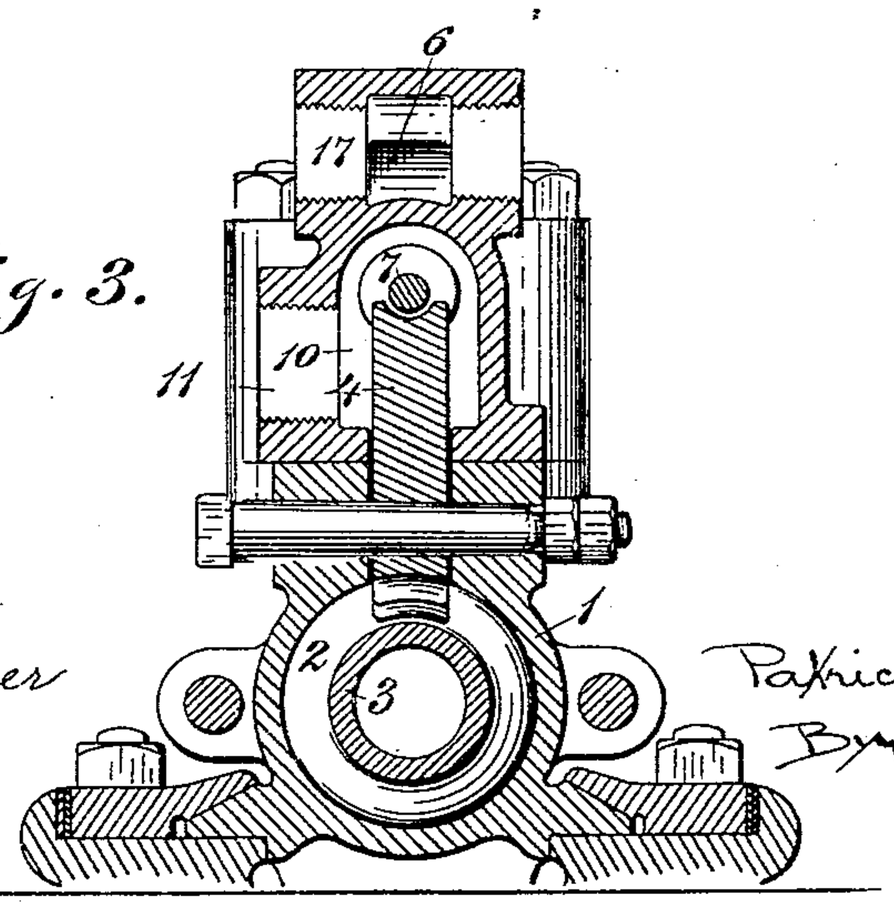

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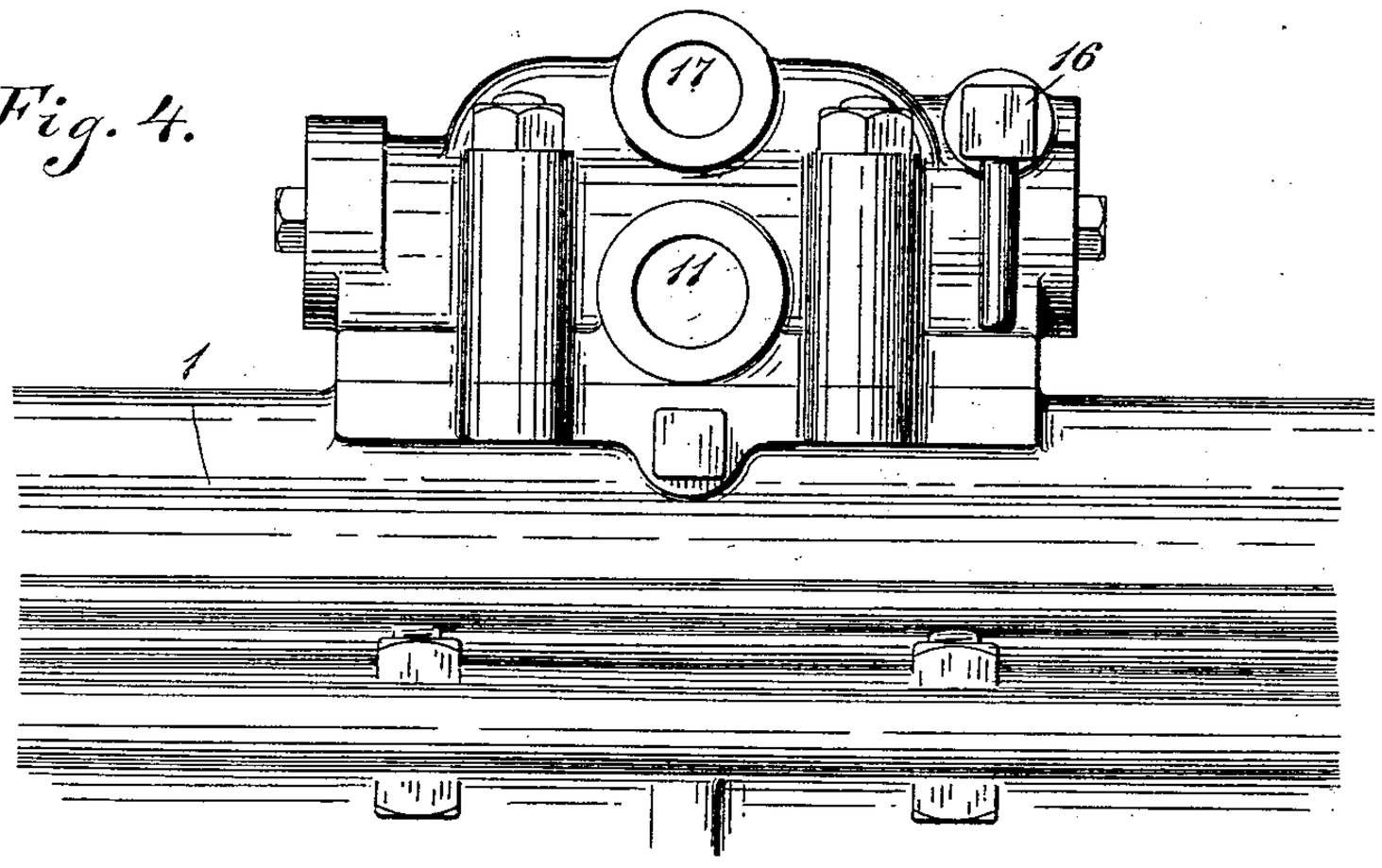
Fig. 4.



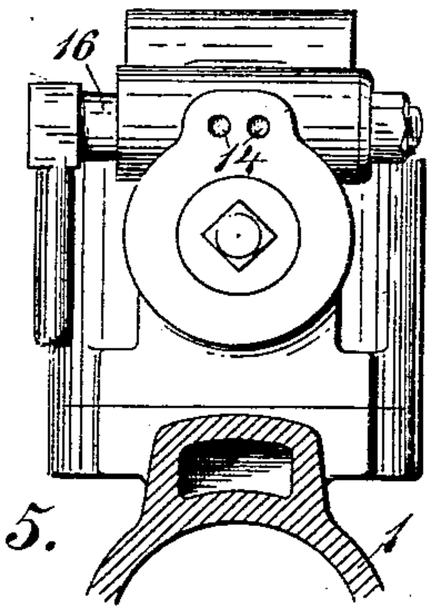


Fig. 5.

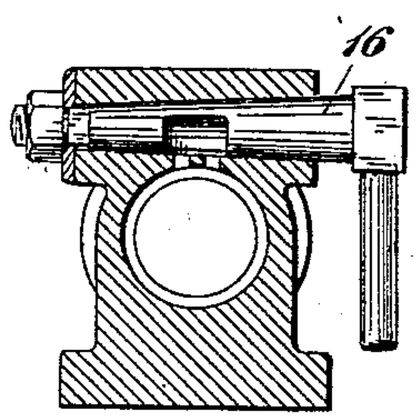


Fig. 6.

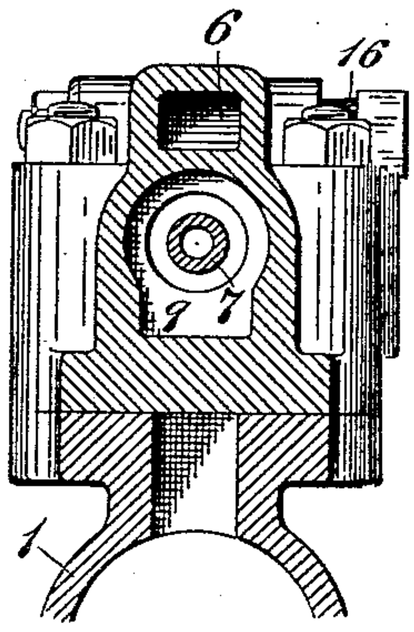


Fig. 7.

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UNITED STATES PATENT OFFICE.

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ENGINE FOR ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 684,307, dated October 8, 1901.

Application filed March 29, 1900. Serial No. 10,684. (No model.)

To all whom it may concern:

Be it known that I, PATRICK H. REARDON, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Engines for Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improvements in direct-acting engines, such as are particularly adapted to fluid-actuated rock-drills.

It relates to the fluid-controlling valve and valve mechanism whereby the piston of the drill is caused to reciprocate in the cylinder.

It consists in the novel devices and combinations, which will be hereinafter described and claimed.

The object of the present invention is to provide a simple and efficient valve motion for drills which will perform the necessary and desirable functions required of the controlling-valve of a rock-drill and perform these functions with the least possible wear and tear and the minimum expenditure of power. These objects are accomplished by means of the devices illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a portion of the engine-cylinder, including a longitudinal section through the fluid-controlling valve and its chamber. Fig. 2 is a plan view of the same portion of the engine-cylinder which is shown in section in Fig. 1. Fig. 3 is a transverse section through line *x* of Fig. 1. Fig. 4 is a side elevation of Fig. 2. Fig. 5 is a transverse section through line *w* of Fig. 1, showing an exterior end view of the valve-chest. Fig. 6 is a transverse section through line *z* of Fig. 1. Fig. 7 is a transverse section through line *y* of Fig. 1.

Referring to the accompanying drawings, and particularly to Fig. 1, 1 is a cylinder having a suitable piston 2 therein, a portion 3 of its length intermediate of its ends reduced in diameter and suitably formed to engage with and operate a pivoted lever 4. The lever 4 is located in a radial slot 5 and extends outwardly into the valve-chest 6, where it engages with a suitable balanced valve 7, preferably lying parallel with the axis of the piston. This valve 7 is preferably formed of a hollow cylindrical rod or piston having that portion of its length which engages with the lever 4 considerably reduced in diameter, the sides of this reduced portion forming shoulders between which the lever 4 bears. The lever 4 where it engages with the valve 7 is preferably slightly forked or notched in a longitudinal direction, as indicated in Fig. 1 and shown particularly in Fig. 3, for the purpose of providing better bearing on the valve. Within the valve-chest and surrounding the valve is a suitable valve-seat 8, having appropriate ports 9 9 communicating with the opposite ends of the cylinder and exhaust-port 10 communicating with the exterior through outlet 11.

The valve 7 is provided with appropriate circumferential bearing-surfaces and grooves to coact with the ports in the valve-seat 8, whereby through the reciprocation of the valve the appropriate distribution of the actuating fluid is effected. The valve 7 is prolonged at both ends, and one of its ends fits snugly in a suitable pocket 12 in the valve-chest wall, the other end of the valve being concentrically guided in suitable guides 13, correspondingly located in the valve-chest, but on the opposite side thereof. The pocket 12 is provided with a port or passage 14, communicating with a port or passage 15, extending from the interior of the valve-chest to the exterior, where it opens into the atmosphere. The passages 14 and 15 together form a three-way valve controlled by a suitable plug 16, whereby the chamber 12 is at will placed in communication with either the interior of the valve-chest or the outside atmosphere. The valve 7 is preferably made uniform on opposite sides of its mid-length, so that it may be put in either way indifferently. An inlet 17 is provided for the admission of the actuating fluid.

In practice the operation of the device is as follows: The valve 7 being a wholly-balanced valve, due to its construction, with the exception that one end of the valve is open to the atmosphere, while the other end is under pressure of the actuating fluid, consequently the valve 7 always moves toward the end open to the atmosphere, thus causing the valve to reverse its action as soon as the engine-piston has traveled sufficient distance to permit the

rock-lever 4 to move. When the plug 16 is turned so as to open communication between the pocket 12 and the valve-chest, the valve 7 becomes a perfectly-balanced valve actuated solely by the engagement of the piston with the rock-lever 4. Consequently the normal stroke of the piston will be increased and the length of stroke determined by the form of the valve-operating portion 3 of the engine-piston.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a direct-acting engine, a fluid-actuated piston and a distributing-valve to control the motion of said piston and means applicable at will whereby the pressure of the actuating fluid is removed from one end of the valve to permit said valve to move in one direction by fluid-pressure.

2. In a direct-acting engine, a fluid-actuated piston and a tappet engaging therewith to effect the motion of a distributing piston-valve therein and means applicable at will whereby the pressure of the actuating fluid is removed from one end of the valve to permit said valve to move in one direction by fluid-pressure.

3. In a direct-acting engine, a fluid-actuated piston and a tappet engaging therewith to effect the motion in one direction of a distributing-valve, a balanced distributing-valve and means whereby the pressure of the actuating fluid is removed from one end of the valve at will while the fluid-pressure remains on the opposite end.

4. In a direct-acting engine, a fluid-actuated piston and a tappet engaging therewith to effect the motion in one direction of a distributing-valve, a balanced distributing piston-valve and means whereby the pressure of the actuating fluid is removed from one end of the valve at will while the fluid-pressure remains on the opposite end.

5. In a direct-acting engine having a fluid-actuated piston, a tappet engaged by said piston, a valve between which and the piston the tappet is interposed to effect the motion of the former by the reciprocation of the latter, one end of said valve being socketed into a recess, said recess having a passage or passages communicating with the valve-chest and with the exterior of the chest and a valve controlling said passage or passages whereby communication is made with the recess for the actuating-fluid pressure or atmosphere at will.

6. In a direct-acting engine having a fluid-actuated piston, a pivoted tappet and a piston-valve between which and the piston the tappet is interposed to effect the operation of the former by engagement of the latter, one end of said valve fitting snugly in a recess which is provided with a passage or passages communicating with the valve-chest and with the exterior of the chest and a valve controlling said passage or passages whereby communication is made with the recess for the actuating-fluid pressure or atmosphere at will.

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