

(No Model.)

W. R. HARRIS.
FLUID PRESSURE MOTOR.

No. 376,821.

Patented Jan. 24, 1888.

FIG. 1.

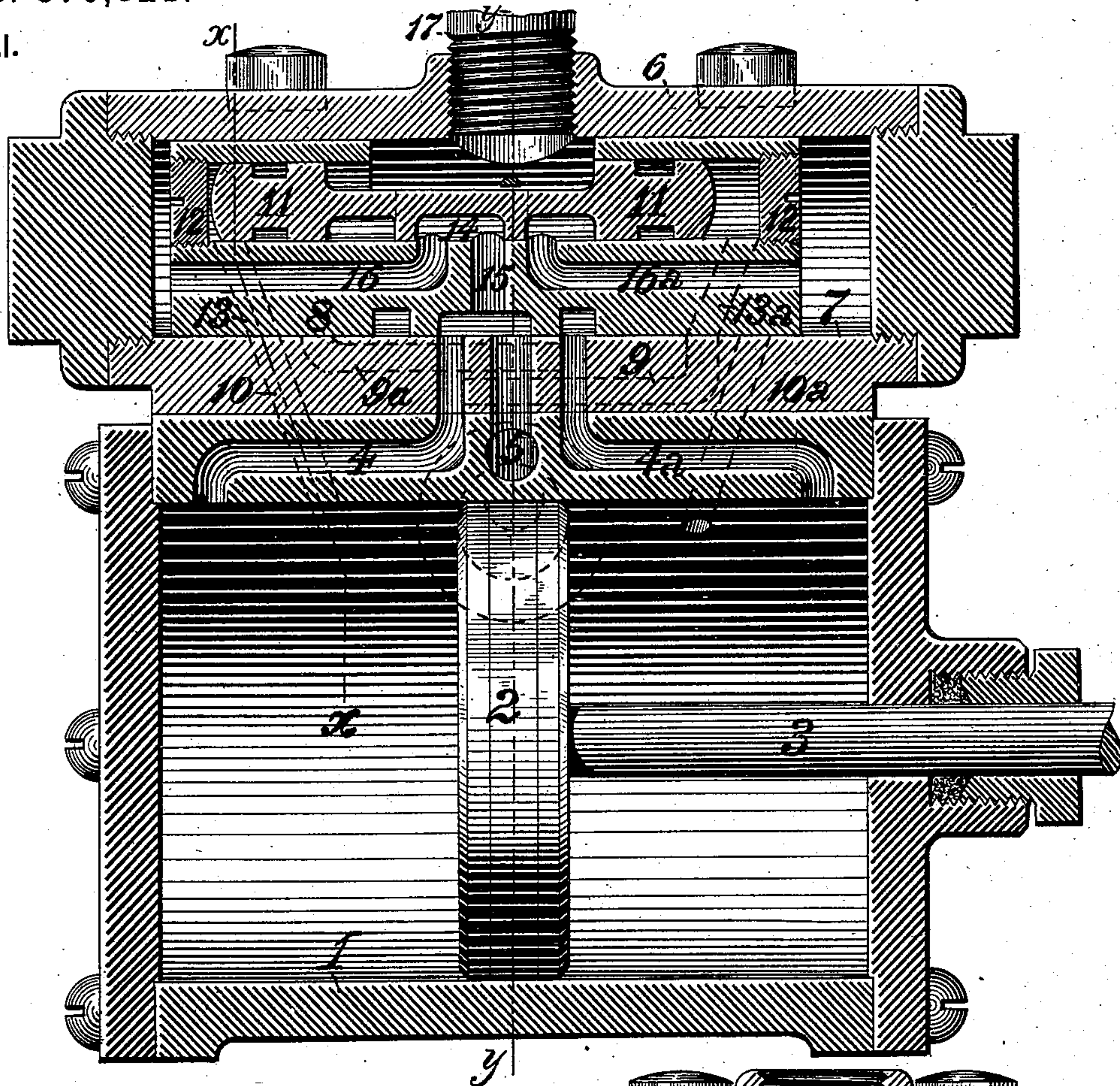


FIG. 2.

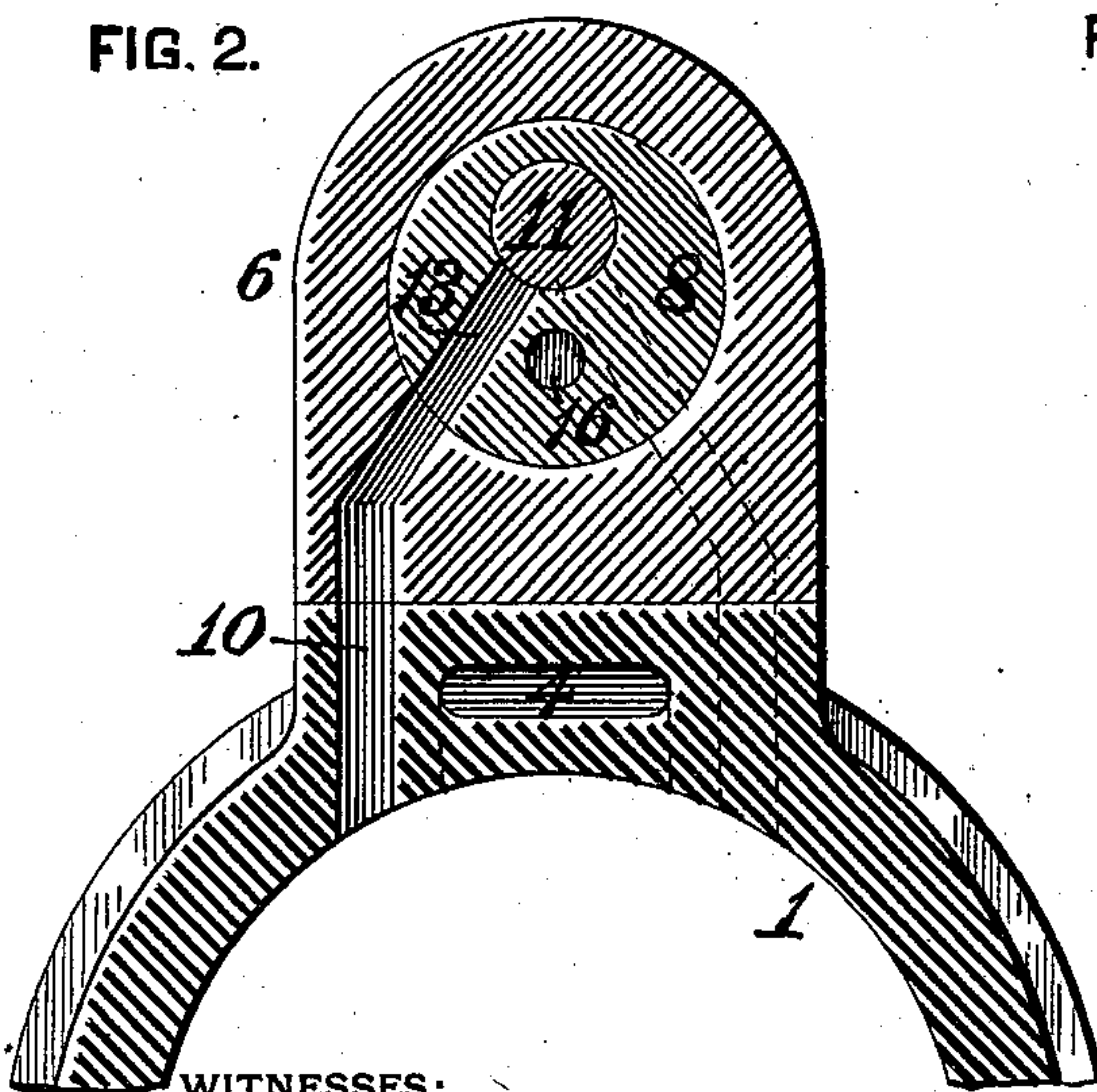
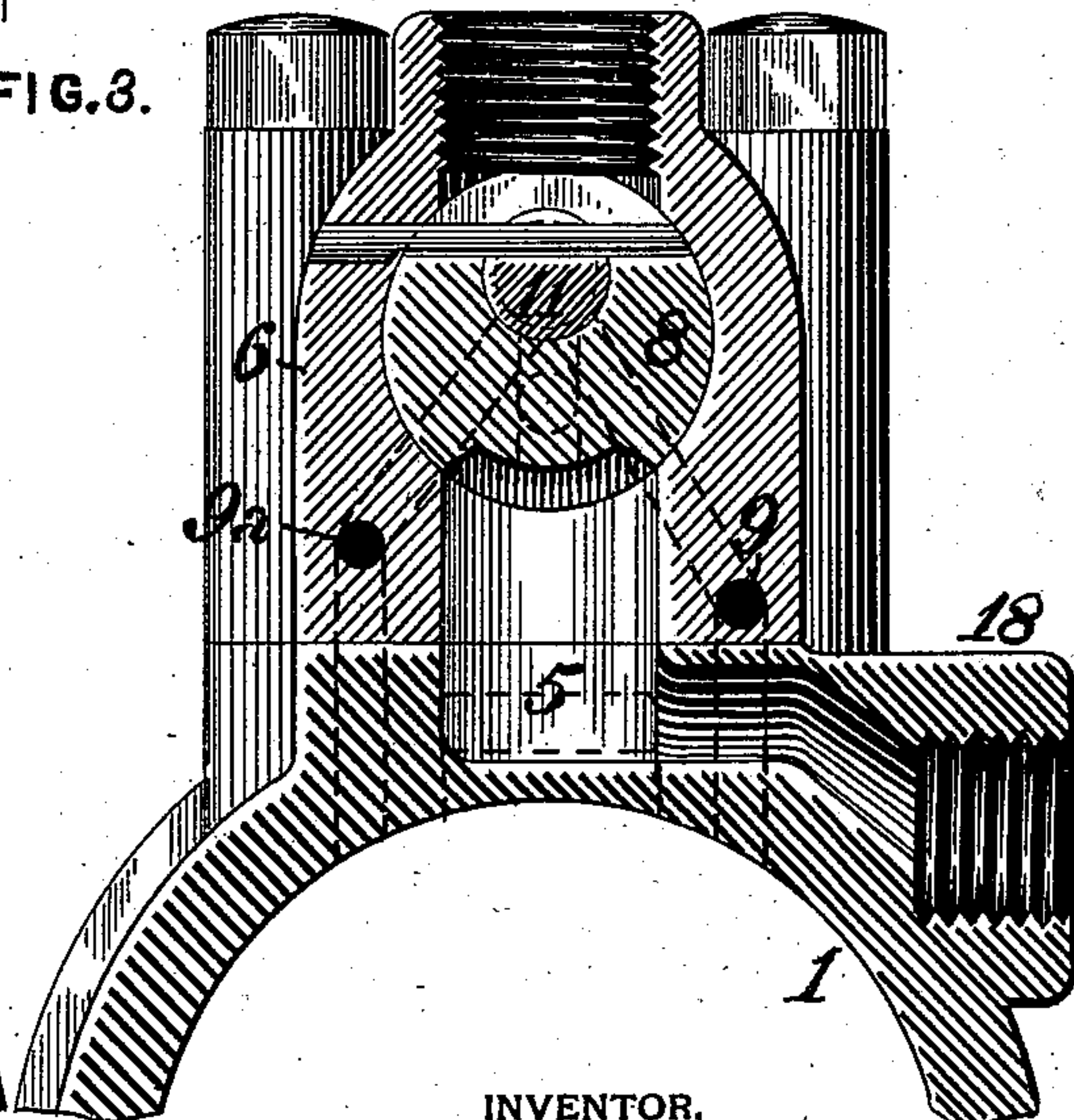


FIG. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM R. HARRIS, OF GREENVILLE, ASSIGNOR TO WILLIAM L. DEMING,
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FLUID-PRESSURE MOTOR.

SPECIFICATION forming part of Letters Patent No. 376,821, dated January 24, 1888.

Application filed September 24, 1887. Serial No. 250,553. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. HARRIS, of Greenville, in the county of Darke and State of Ohio, have invented a certain new and useful Improvement in Fluid-Pressure Motors, of which improvement the following is a specification.

The object of my invention is to provide a simple, compact, and inexpensive motor, specially adapted to service as a pumping or blowing engine, boiler-feeder, or other direct-acting engine in the utilization of water, steam, compressed air, or other fluid under pressure as a motive power.

To this end my invention, generally stated, consists in the combination, with a cylinder having main induction and exhaust ports and supplemental valve-actuating ports, of a distribution-valve governing said ports and provided with supplemental ports, and an auxiliary valve governing the ports of the distribution-valve.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a longitudinal central section through the cylinder and valve-chest of a motor embodying my invention; Fig. 2, a transverse section through the same at the line *x x* of Fig. 1, and Fig. 3 a similar section at the line *y y* of Fig. 1.

In the practice of my invention the cylinder 1 is, as heretofore, fitted with a properly-packed piston, 2, secured upon a piston-rod, 3, to the outer end of which suitable connections can be made in accordance with the work to be performed, and is provided with induction and exhaust ports or passages 4, 4^a, and 5. A valve-chest, 6, is secured upon one side of the cylinder 1, inclosing a valve seat or face, 7, upon which a main or distribution valve, 8, which governs the admission and exhaust of motive fluid to and from the opposite sides of the piston 2, and is preferably of the piston or cylindrical type, is fitted to be reciprocated by the pressure of the motive fluid, as presently to be described. To effect such reciprocation of the main valve 8, and thereby to effect the required alternately-opposite movements of the working-piston 2 without the employment of external valve-gear, the cylinder and main valve are provided with a series of supplemental ports, and an auxiliary valve

is arranged to operate within the main valve, the construction and relation of these members being as follows: A port, 9, is formed in the cylinder, leading from the induction-passage 4 to a point in the valve-face between the opening of the opposite induction-passage, 4^a, and the adjacent end of the valve-face 7, and a similar port, 9^a, leads from the other induction-passage, 4^a, to a corresponding point on the valve-face between the opening of the induction-passage 4 and the adjacent end. A port, 10, leads from the cylinder, at such distance from one end thereof as to be located on the supply side of the piston 2 when at that end of its stroke, to a point on the valve-face between the opening of the port 9^a and the adjacent end of the valve-face, and a port, 10^a, is similarly located relatively to the opposite ends of the cylinder and valve-face. An auxiliary valve, 11, having a piston at each end and recessed or reduced between said pistons so as to communicate with the fluid-supply pipe 17 of the valve-chest, is fitted to reciprocate within the main distribution-valve 8, its movement being limited by end stops, 12, fixed therein, and the auxiliary valve 11 is further provided with a central exhaust cavity or recess, 14, which in the movements of the valve establishes communication between a central exhaust-passage, 15, extending through the main valve, and one or the other alternately of two ports, 16 16^a, leading from points on the seat of the auxiliary valve 11 in the main valve 8 on opposite sides of the exhaust-passage 15 to the adjacent ends of the main valve. Ports 13 13^a lead through the main valve 8 from its face, which fits against the valve-face 7, to that on which the auxiliary valve 11 moves, said ports being so located that at one extremity of the stroke of the main valve the port 13 communicates with the cylinder-port 10 and the port 13^a with the cylinder-port 9, and at the other the port 13 communicates with the cylinder-port 9^a and the port 13^a with the cylinder-port 10^a.

In operation, and assuming the working-piston 2 to be moving in the direction indicated by the arrow, Fig. 1, motive fluid admitted to the valve-chest through the supply-pipe 17 passes around the main valve 8 in a recess between the end pistons thereof, and thence through the induction-passage 4^a to effect the

stroke of the piston 2, the fluid which has performed the preceding stroke being exhausted through the passage 4 and exhaust passages 15 and 5 to the exhaust-pipe 18. As the piston 2 passes and uncovers the port 10 motive fluid passes through the same and through the port 13, which in this position of the valves communicates therewith and moves the auxiliary valve 11 to the right, said valve being free to be moved, as its right-hand end is open to the exhaust through the port 13^a, which communicates through the cylinder-port 9 and passage 4 with the exhaust-passage 5. This movement of the auxiliary piston establishes communication between the supply-pipe 17 and the passage 16 of the main valve and from the passage 16^a of said valve to the exhaust-passages 15 and 5 and exhaust-pipe 18. Pressure being thereby exerted upon the outer end of the left-hand piston of the main valve 8, said valve is thereby thrown to the right and into position to admit motive fluid for the next stroke of the main piston to the right through the induction-passage 4 and to exhaust that which has performed the stroke just completed through the passages 4^a, 15, and 5. The port 13^a is by this movement of the main valve placed in communication with the port 10^a and the port 13 with the port 9^a, so that when the port 10^a is opened to the supply in the right hand stroke of the piston the auxiliary valve 11 and main valve 8 are thrown to the left and restored to the position shown in the drawings to effect the next succeeding left-hand stroke of the main piston.

I claim as my invention and desire to secure by Letters Patent—

1. The combination of a cylinder, a main or distribution valve governing the supply and exhaust thereof, an auxiliary valve governing the supply and exhaust of motive fluid to and from the main valve, and a series of ports located, substantially as described, so as to alternately admit and exhaust motive fluid from the cylinder to and from opposite ends of the auxiliary valve, and thereby establish communication between opposite ends of the main valve and the supply and exhaust pipes alternately, substantially as set forth.

2. The combination of a cylinder provided with induction and exhaust passages, supplemental valve-supply ports leading from the cylinder to its valve face, and valve exhaust-ports leading from the induction-ports to the valve face, a main distribution-valve having pistons at its ends governing the supply and exhaust of the cylinder, said valve having a seat for an auxiliary valve, a central exhaust-passage, ports so located as to communicate alternately with the valve-supply and valve-exhaust ports of the cylinder and ports leading from the auxiliary valve-seat to opposite ends of the main valve, and an auxiliary valve fitting on the main valve and provided with a central exhaust-chamber governing communication between the exhaust-passage of the main valve and the ports leading to the ends thereof, substantially as set forth.

WILLIAM R. HARRIS.

Witnesses:

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EDMUND GARRIGUES.