W. T. LEWIS.

FLUID PRESSURE ENGINE.

APPLICATION FILED FEB. 26, 1906.

916,463.

Patented Mar. 30, 1909.

Fig. 1.

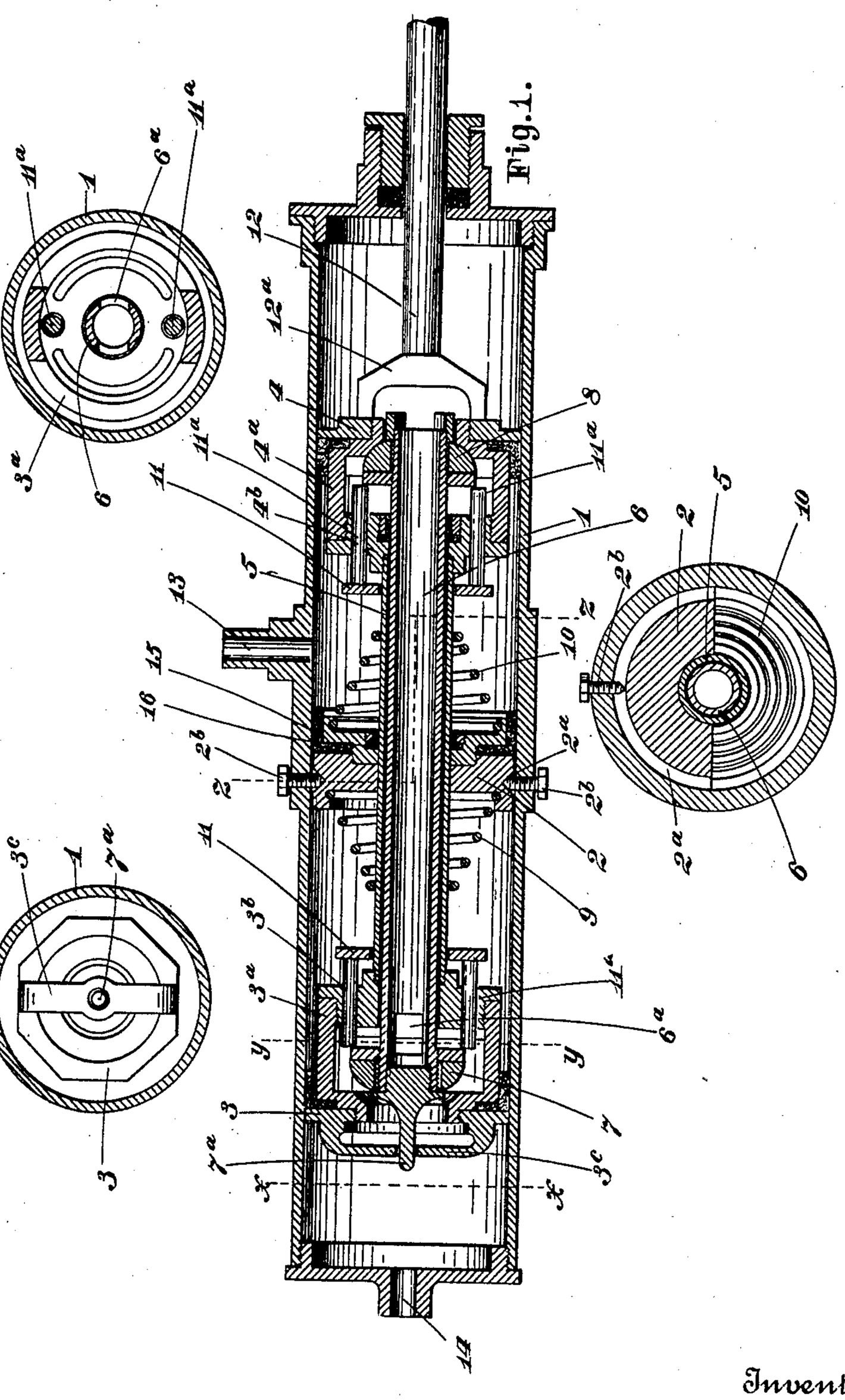

Fig. 3.

Fig. 4.

Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM T. LEWIS, OF COLUMBUS, OHIO.

FLUID-PRESSURE ENGINE.

No. 916,463. Specification of Letters Patent. Patented March 30, 1909.

Application filed February 26, 1906. Serial No. 302,971.

To all whom it may concern:

Be it known that I, WILLIAM T. LEWIS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Fluid-Pressure Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates more especially to the type of fluid pressure engine illustrated in Letters Patent of the United States No. 571,144, dated November 10, 1896, said type comprising in a general way a casing having an interior wall dividing it into two chambers in each of which is a piston and valve, the pistons and valves respectively being connected by means extending through the interior wall. As shown in said patent the chambers at each side of the dividing wall are connected by an outside fluid passage (indicated in the patent by the character 14) and the chief object of the present invention is to provide an improved construction in which this outside passage is dispensed with.

The invention consists in the construction hereinafter described and claimed, it not being my intention to limit myself in its embodiment to the precise forms and arrangement of parts shown in the accompanying drawings.

In the said drawings—Figure 1 is a central longitudinal sectional view; Fig. 2 is a cross section on the line *x*—*x* Fig. 1 looking to the right; Fig. 3 is a cross section on the line *y*—*y* Fig. 1 looking to the right; Fig. 4 is a section on the line *z*—*z* Fig. 1 looking to the left.

In the several views 1 designates the outer casing or cylinder, and 2 a division wall or partition that divides the casing into two chambers. The casing is, of course, provided with appropriate heads at each end thereof. The division wall 2 consists of a disk that has a peripheral groove 2^a, and the division wall is retained in place by several set screws 2^b inserted from the exterior of the casing and engaging the groove.

Within the casing are two pistons 3 and 4 (one in each of the chambers formed by the division wall) rigidly connected by a tube 5 that passes through the center of the division wall. Both the pistons are suitably packed around their peripheries to prevent leakage. The pistons are each composed of two parts threaded together, the inner part being provided with a central opening or port, the inner rim of which is concaved to form a valve seat against which closes a valve to be presently described.

The inner part of each piston is extended as a cylindrical caging 3^a and 4^a provided with ample openings in its sides, and threaded into the inner end of this caging is a cap or head as seen at 3^b and 4^b. Within the cages are valves 7 and 8 adapted to fit on the aforesaid seats; and these valves are rigidly connected by a tube 6 extending through the tube 5. The valves referred to are each comprised of three pieces, to-wit, a backing piece consisting of a metal ring threaded on to the end of the tube, a ring or gasket of rubber or other suitable material having its outer face convex or adapted to fit against the seat in the piston, said ring or gasket being slipped over the threads on the end of the tube, and a plug having a projecting flange as shown at the left hand end of Fig. 1, threading respectively into or onto the end of the tube to hold the ring or gasket in place.

The plug referred to has a guiding teat that extends outward through the opening of the piston into a hole in a yoke piece 3^c on the outer face of the piston. The two valves 7 and 8 are so situated on their connecting tube 6 that the distance between the seating faces of the gaskets thereof is less than the distance between their seats in the piston, or so that when one gasket is seated to close the port through its companion piston, the other valve is off its seat to uncover the corresponding port of its piston. The tube 6 is provided with a lateral opening or port 6^a within the caging 3^a.

Secured on opposite sides of the division wall 2 are coiled springs 9 and 10 tapering from their place of connection outward and toward the connecting tube 5.

On each end of the tube 5 is a ring, as seen at 11, from the outer face of each of which project pins 11^a that pass through holes in the head of the cage and form an abutment at their outer ends for the valve within the cage to hold it from movement with the pistons and effect the closing of one valve and the opening of the other valve

in the reciprocations of the piston as hereinafter described.

12 designates a rod that is shown to be connected by means of an appropriate open yoke 12ª with the piston at the right hand side of the device. This rod may be used to operate a pump, organ bellows, a sewing machine, a washing machine, or to do any other work desired.

13 designates the inlet for the operating fluid. This inlet is located at one side of the division wall 2, while the discharge or exhaust designated 14 is located at the opposite side of said wall.

The operation is as follows: In Fig. 1 the pistons and valves are shown as when moving toward the right. In this position or movement the valve at the right is closed upon the opening of the companion piston and the pressure of the incoming fluid is acting on the inner side of the piston and valve and both pistons and valves are moved toward the right. Fluid in the right hand chamber beyond the piston exhausts through the inner tube 6, the port 6ª therein, around the valve 7, through the opening of the piston 3, and out at the discharge 14. When nearing the completion of this movement to the right the ring 11 on the left hand end of the tube 5 abuts against the spring 9 and arrests the valves and their connecting tube so that upon further movement of the pistons to the right the valve at the right is unseated from its piston and the valve at the left becomes seated on its piston. The pressure of the incoming fluid is then reversed with reference to the pistons and valves and is exerted through the chamber at the right, the inner tube 6, and the port 6ª therein on the left hand piston and valve, and both pistons and valves are consequently moved to the left. In this movement to the left the fluid in the left hand chamber beyond the left hand piston is, of course, directly discharged through the discharge port 14. And when the pistons and valves are nearing the limit of their movement toward the left the ring corresponding to the ring 11 in the right hand chamber abuts against the spring 10 and the motion of the valves and their connecting tube arrested in the same manner as before described, the arresting of the valves and their connecting tube causing the right hand valve to close the port through its companion piston after which the piston and valve are moved to the right as before described and as depicted in Fig. 1. The division wall 2 may be provided with any suitable packing 15 to prevent leakage around its rim from one chamber into the other, and suitable packing 16 may be also provided to prevent leakage between the division wall 2 and the tube 5. The right hand head of the cylinder 1 where the rod 12 passes through it may be provided with a suitable stuffing box and packing, as shown, to prevent leakage through the opening provided for said rod. The purpose of the springs 9 and 10 is to cushion the arrest of the valves and their connecting tube and so prevent noise in operation and jarring of the parts.

It will be observed that in this construction passages for the operating fluid external to the casing 1 and between the two chambers are avoided and the construction of such engines therefore greatly simplified and cheapened.

In another application filed concurrently herewith and having Serial No. 302,970, I have shown another form and claimed broadly the invention herein shown.

What I claim and desire to secure by Letters Patent is:

1. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior of the casing into two chambers, a piston and coöperating valve in each of said chambers, means connecting the pistons, a tube connecting the valves passing through said dividing wall and means for automatically shifting the pressure of the operating fluid from one piston to the other through said tube.

2. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior of the casing into two chambers, a piston and coöperating valve in each of said chambers, a tube connecting the pistons, a tube connecting the valves passing through said dividing wall and means for automatically shifting the pressure of the operating fluid from one piston to the other through said tube.

3. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior of the casing into two chambers, a piston provided with a port and a coöperating valve in each of said chambers, means connecting the pistons, and a fluid conductor connecting the valves and passing through said dividing wall and reciprocable with respect to the pistons to open and close the ports thereof and means for arresting the valves and their connecting tube to effect the opening of one port and the closing of the other.

4. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior of the casing into two chambers, a piston provided with a port and a coöperating valve in each of said chambers, means connecting the pistons, and a tube connecting the valves passing through said dividing wall and reciprocable with respect to the pistons to open and close the ports therein, and means for arresting the valves and their connecting tube to effect the opening of one port and the closing of the other, said means including a cushioning device.

5. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, a piston provided with a port and a coöperating valve for the port in each of said chambers, means connecting the pistons, a tube connecting the valves passing through the dividing wall, a headed cage on the piston inclosing the valve, and a movable device entering the cage and affording an abutment for the valve.

6. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, a piston provided with a port and a coöperating valve for the port in each of said chambers, means connecting the pistons, a tube connecting the valves passing through the dividing wall, a headed cage on the piston inclosing the valve, an arresting cushion and a movable device between the cushion and valve.

7. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior of the casing into two chambers, one of which has an inlet and the other an outlet or exhaust, a piston and a coöperating valve in each of said chambers, means connecting the pistons, a tube connecting the valves passing through said dividing wall and means for automatically shifting the pressure of the operating fluid from one piston to the other through said tube, the inlet chamber also exhausting through said tube.

In testimony whereof I affix my signature, in presence of two witnesses.

WILLIAM T. LEWIS.

Witnesses:

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