W. T. LEWIS.

FLUID PRESSURE ENGINE.

APPLICATION FILED FEB. 26, 1906.

906,808. Patented Dec. 15, 1908.

Fig. 7.

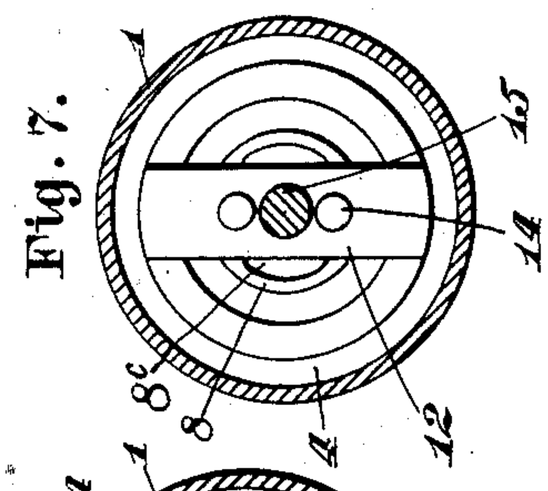


Fig. 6.

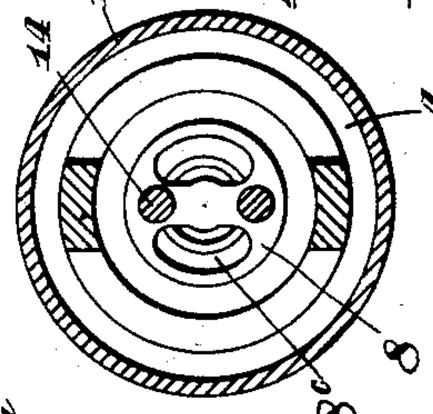


Fig. 5.

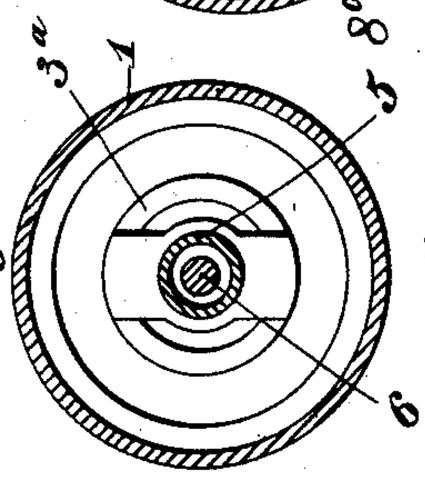


Fig. 4.

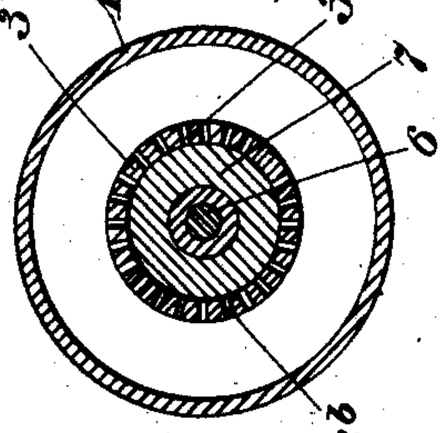
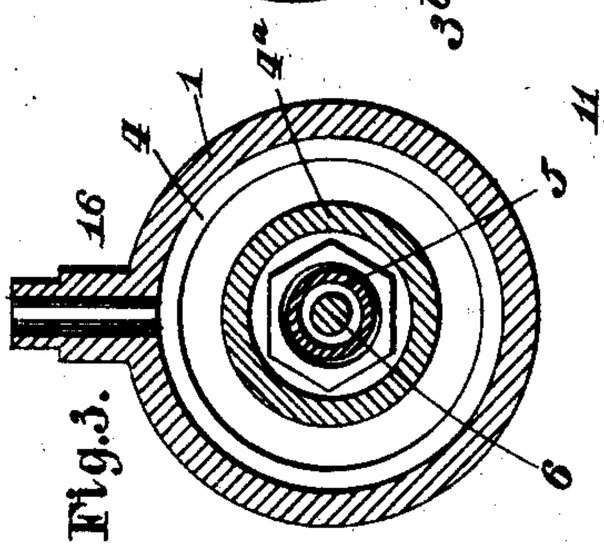


Fig. 3.



Witnesses
Benj. Finkel
Alice B. Cook.

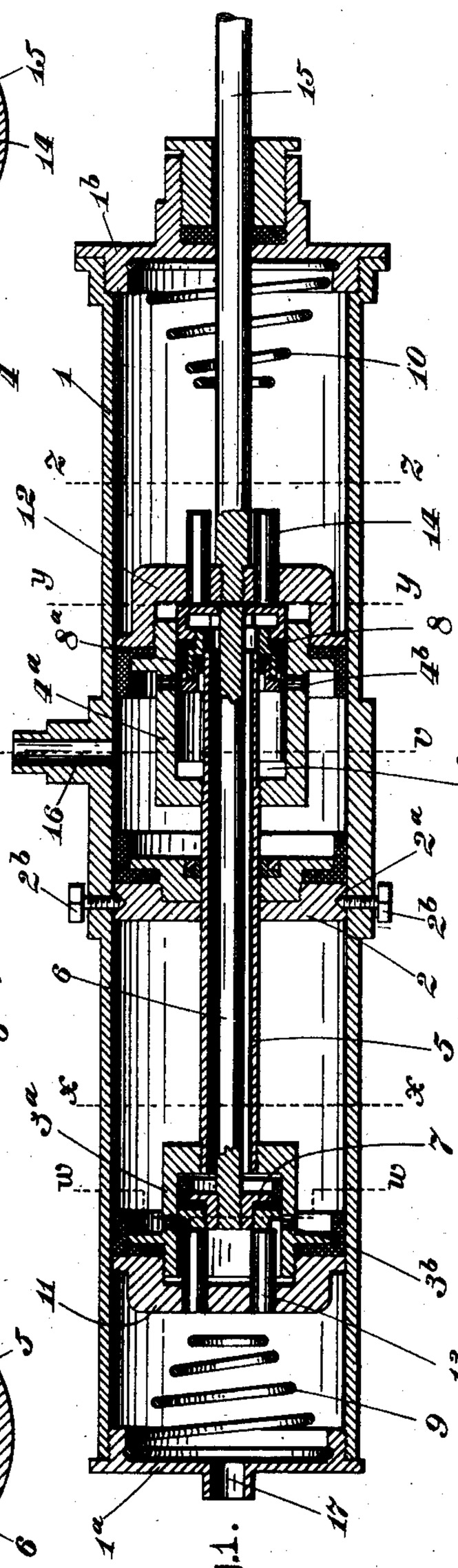


Fig. 1.

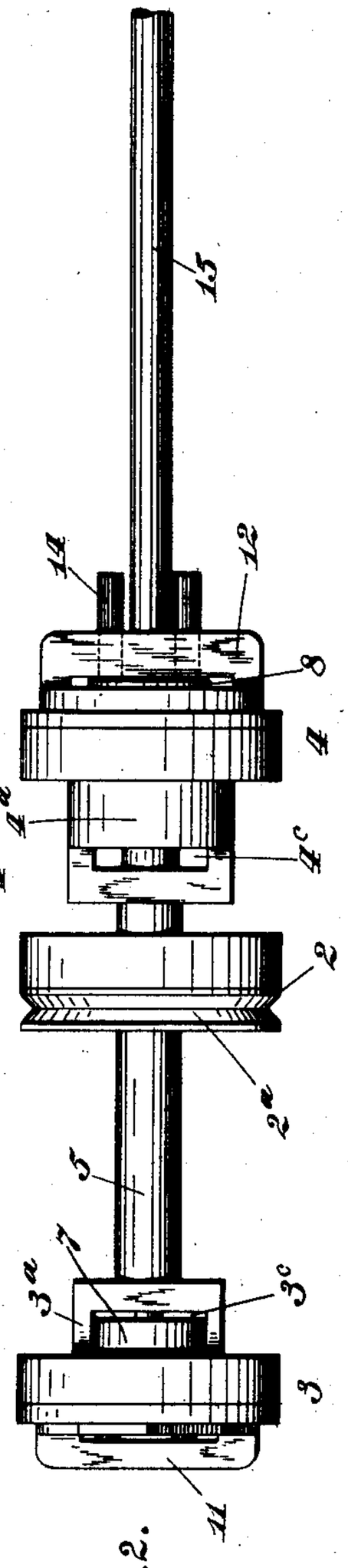


Fig. 2.

Inventor

William T. Lewis

by Finnell & Finnell

his Attorneys

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM T. LEWIS, OF COLUMBUS, OHIO.

FLUID-PRESSURE ENGINE.

No. 906,808. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed February 26, 1906. Serial No. 302,970.

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 10th, 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 a 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 and the construction thereby simplified and cheapened.

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

The invention consists in the construction hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a central, longitudinal, sectional view taken through the inlet, some parts being left in full; Fig. 2 is a side view of the pistons, valves and division wall; Fig. 3 is a cross section on the line *v—v* Fig. 1 looking to the right; Fig. 4 is a cross section on the line *w—w* Fig. 1 looking to the right; Fig. 5 is a cross section on the line *x—x* Fig. 1 looking to the left; Fig. 6 is a cross section on the line *y—y* Fig. 1 looking to the left; Fig. 7 is a cross section on the line *z—z* looking to the left.

In the several views 1 designates the outer casing or cylinder, and 2 a division wall that separates the interior of the casing into two chambers. The casing 1 is provided with appropriate heads 1^a and 1^b at the ends thereof. The division wall 2 consists of a disk provided with a peripheral groove 2^a, and 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) that are rigidly connected by a tube 5 that passes through the center of the division wall. Both pistons are suitably packed around their peripheries to prevent leakage around them. The pistons are each composed of two parts threaded together, the inner part being provided with a cylindrical extension or cage, as seen at 3^a and 4^a, each open at its outer end, and they are provided annularly with a port shown as a series of small openings 3^b and 4^b and liberal openings 3^c and 4^c in their sides near or at their inner ends. Within the cylindrical extensions or cages 3^a and 4^a of the pistons are piston-like valves 7 and 8 adapted to move or reciprocate within the cages like pistons. These valves are rigidly connected by means of a rod 6 extending through the tube 5. The tube 5, however, is shown to extend into the cage or cylindrical extension 4^a of the piston 4, and the valve 8 is centrally hollow and works on the end of the tube 5, but a suitable packing is provided as seen at 8^a to prevent the passage of the operating fluid between the valve and tube and into the latter when the valve is at the right or beyond the port 4^b. The valve 8 is made with ports 8^c in its outer end. The rod 6 is of such length that when the valve at one side is in position to allow the operating fluid to pass through the annular port 4^b therein and into the chamber beyond, the valve at the opposite side is in position to prevent a similar passage of fluid at said opposite side.

In the heads of the cylinder 1 are secured, in any suitable manner, conical coiled springs 9 and 10 with their small ends pointing toward the pistons, and sliding in yokes 11 and 12 on the outer sides of the pistons are pins 13 and 14 having their inner ends adapted to form an abutment for the adjacent valve and their outer ends in position to strike the adjacent spring.

15 designates a rod that passes through the head 1^b and is connected with the yoke 12 of the piston in the right hand chamber. This

rod may be used to operate a pump, organ bellows, sewing machine, a washing machine, or to do any other work desired.

16 designates the inlet for the operating fluid. This inlet is located at one side of the division wall 2, while the discharge or exhaust which is designated 17 is located at the opposite side of said wall. The division wall 2 can be suitably packed where the tube 5 passes through it to prevent leakage at that place from one chamber into the other.

The operation is as follows: In Fig. 1 the pistons are shown as when moving toward the right. In this position or movement the valve at the right is beyond the small annular ports 4^b and the fluid which comes in at 16 is precluded from passing through the piston into that portion of the chamber beyond the piston and the pressure of the operating fluid is acting on the inner side of the piston and valve and both the pistons and both the valves are moved toward the right. Fluid in the right hand chamber beyond the piston exhausts through the port 8^c in the valve 8 through the tube 5, the openings in and laterally through the cylindrical extension 3^a into the left hand chamber but at the right hand side of the piston therein through the ports 3^b, past the yoke 11 and out at the discharge 17. When near the completion of this movement to the right the pins 14 strike the spring 10 and arrest the movement of the valves, but the pressure on the right hand piston continues until the annular ports 4^b pass the valve and the operative fluid passes through the piston into the chamber beyond. When the annular ports 4^b are thus opened the annular ports 3^b are closed or the cylindrical extension is moved so that said ports 3^b are on the right hand side of the valve in said extension and the passage of fluid through the left hand piston is thus cut off and the pressure of the operating fluid is exerted on said piston and valve through the tube 5. In other words, the pressure of the operating fluid may be said to be shifted by the shifting of the valves and piston with reference to each other from the right hand piston to that at the left. During the movement of the pistons and valves to the left the pins 13 are, of course, protruding, and when they strike the spring 9 they and the valves are held until those parts assume the position seen in Fig. 1, when the movement is again to the right as first described.

The purpose of the springs 9 and 10 is to cushion the arrest of the valves and their connecting tube and so prevent noise and jarring of the parts in operation.

As in the construction described in my application for patent herein referred to it will be observed that passages for the operating fluid external to the casing 1 and between the two chambers are avoided, and that the construction is consequently greatly simplified and cheapened.

In another application filed concurrently herewith, having S. No. 302,971, I have claimed another species of the invention herein broadly claimed.

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 thereof into two chambers, pistons in said chambers, cylindrical extensions in said pistons having an annular port, a tube rigidly connecting said pistons, piston-like valves in the said cylindrical extensions, and a rod rigidly connecting said valves.

2. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, pistons in said chambers provided with cylindrical extensions having an annular port, a tube rigidly connecting said pistons, piston-like valves in the said cylindrical extensions, and means rigidly connecting the valves whereby the pressure of the operating fluid is shifted through the tube from one piston to the other upon the shifting of the valves.

3. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, an inlet for the operating fluid into one of said chambers and an exhaust or outlet from the other, pistons in said chambers provided with cylindrical extensions having an annular port, a tube rigidly connecting the pistons and projecting into the cylindrical extension of the piston at the inlet side of the casing, valves in said cylindrical extensions, a rod connecting said valves, the valve in the inlet side of the casing working on the projecting end of the piston-connecting tube in said extension, substantially as described.

4. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, an inlet for the operating fluid into one of said chambers, an outlet from the other, pistons in said chambers provided with cylindrical extensions having an annular port, a tube rigidly connecting the pistons, valves in said cylindrical extensions, and a rod connecting the valves, the valve in the inlet side of the casing being adapted to open and close access of the operating fluid to the tube connecting the pistons.

5. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, an inlet for the operating fluid into one of said chambers, an outlet from the other, pistons in said chambers provided with cylindrical extensions having an annular port, a tube rigidly connecting the pistons, valves in said cylindrical extensions, a rod connecting the

valves, the valve in the inlet side of the casing being adapted to open and close access of the operating fluid to the tube connecting the pistons, and a cushioning device for the valves.

6. In a fluid pressure engine, the combination of the outer casing, a wall dividing the interior thereof into two chambers, an inlet for the operating fluid into one of said chambers, an outlet from the other, pistons in said chambers provided with cylindrical extensions having an annular port, a tube rigidly connecting the pistons, valves in said cylindrical extensions, a rod connecting the valves, the valve in the inlet side of the casing being adapted to open and close access of the operating fluid to the tube connecting the pistons, and a cushioning device for the valves including a pin supported in the piston and a spring supported in the casing beyond the piston.

7. In a fluid motor, a cylinder divided into two chambers, piston heads operating in the chambers, a fluid conductor connecting the piston heads, and controlling means associated with the piston heads and having connection through the fluid conductor.

8. In a fluid motor, a cylinder divided into two chambers, one having a supply inlet and the other having a fluid outlet, a fluid conductor establishing the only means of communication between the chambers, piston heads carried on each end of the fluid conductor, and means associated with the piston heads for controlling the passage of fluid therethrough and the stroke thereof.

9. In a fluid motor, a cylinder divided into two chambers one having a supply inlet and the other having a fluid outlet, a fluid conductor establishing the only means of communication between the chambers, piston heads carried on each end of the fluid conductor, and valves associated with the piston heads for controlling the passage of fluid therethrough and the stroke thereof.

10. In a fluid motor, a cylinder divided into two chambers one having a supply inlet and the other having a fluid outlet, a piston head operating in each chamber, a fluid conductor connecting the piston heads, valves associated with the piston heads and adapted to move therewith and means for arresting the valves as the pistons near the ends of their strokes to alter the direction of flow of the fluid.

11. In a fluid motor, a cylinder divided into two chambers one having a supply inlet and the other having a fluid outlet, a fluid conductor extending into both chambers, piston heads operating in both chambers and connected to the conductor, valves mounted in said piston heads adapted to cut off and establish communication therethrough, and means having connection with the valves for controlling the position of the same.

12. In a fluid motor, a cylinder divided into two chambers one having a supply inlet and the other having a fluid outlet, piston heads operating in the chambers each provided with a valve casing, a fluid conductor extending between the piston heads, valves arranged in the valve casings, and means having engagement with said valves through the fluid conductor for controlling the position of the same.

13. 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 valve in each of said chambers and a passage way for the access and exhaust of the operating fluid through the dividing wall, and means for automatically shifting the pressure of the operating fluid from one piston to the other through said passage way.

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

WILLIAM T. LEWIS.

Witnesses:
OLIN J. ROSS,
BENJ. FINCKEL.