No. 896,211.

PATENTED AUG. 18, 1908.

F. E. JENKINS.

FLUID MOTOR.

APPLICATION FILED JUNE 14, 1906.

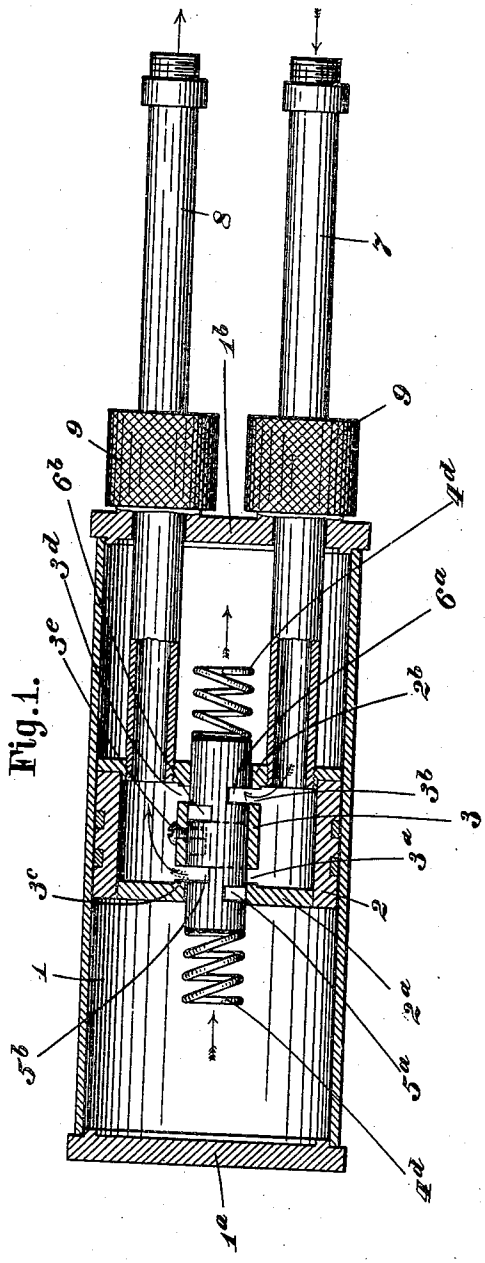

Fig. 1.

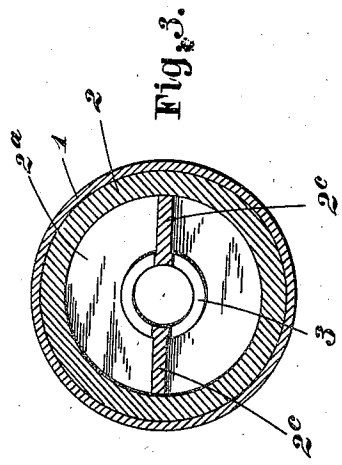

Fig. 3.

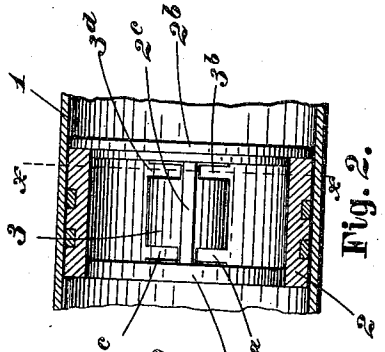

Fig. 2.

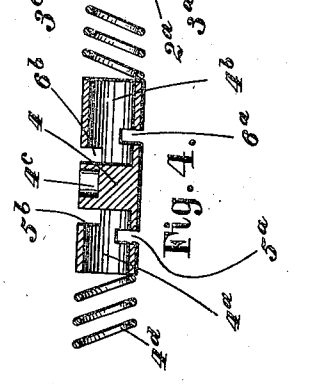

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK E. JENKINS, OF COLUMBUS, OHIO, ASSIGNOR TO WILLIAM T. LEWIS, OF COLUMBUS, OHIO.

FLUID-MOTOR.

No. 896,211. Specification of Letters Patent. Patented Aug. 18, 1908.

Application filed June 14, 1906. Serial No. 321,641.

To all whom it may concern:

Be it known that I, FRANK E. JENKINS, 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-Motors; 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.

The object of this invention is to provide an improved fluid motor of simple and economical construction and one that is not easily liable to derangement.

The invention consists in the construction hereinafter described and claimed, the invention not being confined to the precise forms and proportions of parts shown.

In the accompanying drawings showing an embodiment of the invention—Figure 1 is generally a longitudinally sectional view some details being left in full; Fig. 2 is a detail of the piston partially in section and partially in full; Fig. 3 is a cross section of the cylinder and piston on the line x—x Fig. 2; Fig. 4 is a longitudinal section of the valve.

In the several views 1 designates the cylinder having heads 1^a and 1^b, the latter being, as hereinafter described, perforated for the passage of two moving pipes.

The piston is comprised of an outer ring 2 suitably packed and fitting to slide in the cylinder, and an interior structure comprising heads 2^a and 2^b connected by a partition or web 2^c in the center of which is the valve seat 3.

The valve seat 3 is tubular in construction, the axis of its bore being shown to be coincident with that of the outer ring 2 and cylinder 1, and said valve seat is provided with inlet ports 3^a and 3^b at one side of the web 2^c and exhaust ports 3^c and 3^d at the opposite side. The ports 3^a and 3^c are in the same vertical plane at one side and the ports 3^b and 3^d are in the same vertical plane at the opposite side of the center of the valve seat.

The valve is a tubular structure constructed to fit and slide within the seat 3. It is divided at or near its middle with a wall 4 to form tubular chambers 4^a and 4^b at opposite ends of the valve. The chamber 4^a has an inlet port 5^a and an exhaust port 5^b, and the chamber 4^b an inlet port 6^a and an exhaust port 6^b. The dividing wall 4 is provided with an elongated groove 4^e into which projects the end of a screw or pin 3^e to limit the throw of the valve in either direction longitudinally in its seat. The inlet port 5^a is so located that it is closed by the head 2^a when the said port has been moved toward said head to the limit of the stroke of the valve in that direction; and the port 6^a is closed by the head 2^b when said port has been moved toward it to the limit of the stroke of the valve toward that head. The extremities of the valve are provided with cushions shown to be coiled springs 4^d soldered thereto.

From an inspection of the drawing it will be noted that the adjacent sides of the ports 5^a and 5^b lie in substantially the same plane, and also that this is true of the ports 6^a and 6^b. And further, it will be noted that the ports 3^a, 3^b, 3^c and 3^d are all of the same width and of a width equal to the ports 5^a, 5^b, 6^a and 6^b, and that the ports are so positioned with reference to each other that when an inlet port is opening the coöperating exhaust port is correspondingly opening. In other words, the several opening and closing movements of the ports begin substantially simultaneously, and the passage of the valve over the "dead" point is instantaneous and there is no point where all the ports are closed. Liability of stoppage of the motor is thus rendered inappreciable.

7 and 8 are the inlet and exhaust pipes. Each fits and passes through an appropriate opening in the head 1^b of the cylinder 1, the said openings being provided with suitable packings or stuffing boxes 9 to prevent leakage. The pipes 7 and 8 are connected to the piston and communicate with the interior thereof—one on one side and the other on the other side of the wall or partition 2^c. The pipes 7 and 8 move with the piston in its reciprocations, and flexible hose may be attached to the outer extremities of said pipes to convey the fluid to the one and from the other. To transmit and utilize the power developed in the motor the thing to be operated can be connected to either or both of the pipes 7 and 8.

The operation is as follows: If 7 be the inlet pipe for, say, water under pressure, the water will pass (when the parts are in the position seen in Fig. 1) into the lower compartment of the piston and thence through the ports 3^b and 6^a and valve chamber 4^b into the

right hand end of the cylinder and after filling the same force the piston to the left until the cushioning spring at the left hand end of the valve strikes the cylinder head 1^a. The resistance of the head 1^a will alter the position of the valve with reference to the piston and permit the propelling fluid to pass through the ports 3^a, 5^a and chamber 4^a into the left hand end of the cylinder, whereupon the piston will be propelled in the opposite direction, the cushioned right hand end of the valve being carried into contact with the head 1^b and the valve shifted to the position indicated in Fig. 1. When under the aforesaid circumstances the piston is forced to the left the fluid in that end is exhausted through the valve chamber 4^a, port 5^b, port 3^c, the upper compartment of the piston and pipe 8, and when the piston is forced to the right the fluid in that end is exhausted through the chamber 4^b, port 6^b, port 3^d, the upper compartment of the piston and said pipe 8.

The fitting between the parts will, of course, be made as fluid-tight as practicable and consistent with the successful and satisfactory operation of the construction.

The construction as herein shown and described embodies generally types of parts found severally in prior motors, but my said construction involves a combination of such parts coöperating to produce great simplicity, cheapness and compactness of construction as well as rapidity and certainty of operation and efficiency in work. It will be noted that the combination of the single structure constituting the valve avoids, among other things, multiplication of separate valves, valve stems, and ports or seats, and the inclosed or hollow piston permits of compactness lengthwise of the cylinder.

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

1. In a fluid motor, the combination of the headed cylinder, a hollow piston fitting therein, said piston having an inclosing rim and a web dividing the piston transversely into pressure and exhaust chambers, a valve seat formed in conjunction with said web, said seat provided with ports into said pressure and exhaust chambers, a tubular valve provided with a wall dividing it transversely into two portions one communicating with the cylinder at each side of the piston, said valve fitting to slide in said seat and having ports adapted to be alternately opened and closed by said seat to alternately establish supply and exhaust communication of said piston chambers through the valve with the interior of the cylinder at opposite sides of the piston said seat and valve ports being so positioned with reference to each other that when an inlet port is opening the coöperating exhaust port at the same end of the valve is closing springs to act on opposite ends of said valve and fluid conductors connected respectively with the supply and exhaust chambers of the piston and movably extending through the cylinder to the exterior thereof.

2. In a fluid motor, the combination of the headed cylinder, a hollow piston fitting therein having an inclosing rim and a web dividing the piston diametrically into pressure and exhaust chambers, a valve seat formed in conjunction with said web provided with ports into said pressure and exhaust chambers, said ports lying in the same plane transversely of the seat, a tubular valve provided with a wall dividing it into two portions one communicating with the cylinder at each side of the piston, said valve fitting to slide in said seat and having ports lying in different planes transversely of said valve adapted to be alternately opened and closed by said seat to alternately establish supply and exhaust communication of said piston chambers through the valve with the interior of the cylinder at opposite sides of the piston, said seat and valve ports being so positioned with reference to each other that when an inlet port is opening the coöperating exhaust port at the same end of the valve is closing springs to act on opposite ends of said valve, and fluid conductors connected respectively with the supply and exhaust chambers of the piston and movably extended through the cylinder to the exterior thereof.

3. In a fluid motor, the combination of the headed cylinder, a hollow piston fitting therein having an inclosing rim and a web dividing the interior of the piston diametrically into pressure and exhaust chambers, a valve seat formed in conjunction with said web provided with ports 3^a and 3^b and 3^c and 3^d in said pressure and exhaust chambers respectively, said ports lying in the same plane transversely of the seat, a tubular valve provided with a wall dividing it into two portions, one communicating with the cylinder at each side of the piston, said valve fitting to slide in said seat and having in said portions ports 5^a and 5^b and 6^a and 6^b respectively, lying in different planes transversely of the valve and with their adjacent sides respectively lying in substantially the same plane, and located with reference to the ports of the aforesaid seat so that the opening and closing of the respective ports commence simultaneously, substantially as shown and described.

4. In a fluid motor, the combination of a headed cylinder, an inclosed piston fitting therein, a web dividing the piston into pressure and exhaust chambers, a valve seat formed in conjunction with said web provided with ports 3^a and 3^b and 3^c and 3^d opening into said pressure and exhaust chamber respectively, a tubular valve provided with a wall dividing it into two portions, one communicating with the cylinder at each

side of the piston, said valve fitting in said valve seat and having in said portions ports 5^a and 5^b and 6^a and 6^b respectively, all said ports being so positioned with reference to each other that when an inlet port is opening the coöperating exhaust port at the same end of the valve is closing, substantially as described.

5. In a motor, the combination of a cylinder, a piston within the cylinder containing two separate compartments, a piston rod provided with two separate channels each communicating with a compartment in the piston, a valve casing in the piston and having ports communicating with said compartments, a slidable valve in the valve casing and having ports adapted to throw the piston compartments into communication with opposite sides of the cylinder alternately upon being shifted, and means for shifting the valve at the end of each stroke, substantially as set forth.

6. In a fluid motor, the combination of the headed cylinder, a hollow piston fitting therein, said piston having an inclosing rim and a web dividing the piston transversely into pressure and exhaust chambers, a valve seat formed in conjunction with said web, said seat provided with ports into said pressure and exhaust chambers, a tubular valve provided with a wall dividing it transversely into two portions one communicating with the cylinder at each side of the piston, said valve fitting to slide in said seat and having ports adapted to be alternately opened and closed b- said seat to alternately establish supply and exhaust communication of said piston chambers through the valve with the interior of the cylinder at opposite sides of the piston, said seat and valve ports being so positioned with reference to each other that when an inlet port is opening the coöperating exhaust port at the same end of the valve is closing, yielding devices to act on opposite ends of said valve, and fluid conductors connected respectively with the supply and exhaust chambers of the piston and extending through the cylinder to the exterior thereof.

7. In a fluid motor, the combination of the headed cylinder, a hollow piston fitting therein having an inclosing rim and a web dividing the piston diametrically into pressure and exhaust chambers, a valve seat formed in conjunction with said web provided with ports into said pressure and exhaust chambers, said ports lying in the same plane transversely of the seat, a tubular valve provided with a wall dividing it into two portions one communicating with the cylinder at each side of the piston, said valve fitting to slide in said seat and having ports lying in different planes transversely of said valve adapted to be alternately opened and closed by said seat to alternately establish supply and exhaust communication of said piston chambers through the valve with the interior of the cylinder at opposite sides of the piston, said seat and valve ports being so positioned with reference to each other that when an inlet port is opening the coöperating exhaust port at the same end of the valve is closing, yielding devices to act on opposite ends of said valve, and fluid conductors connected respectively with the supply and exhaust chambers of the piston and extended through the cylinder to the exterior thereof.

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

FRANK E. JENKINS.

Witnesses:

ULYSSES R. PETERS,

BENJ. FINCKEL.