J. I. SHIRLEY.

ELASTIC FLUID MOTOR.

APPLICATION FILED SEPT. 1, 1906.

958,553.

Patented May 17, 1910.

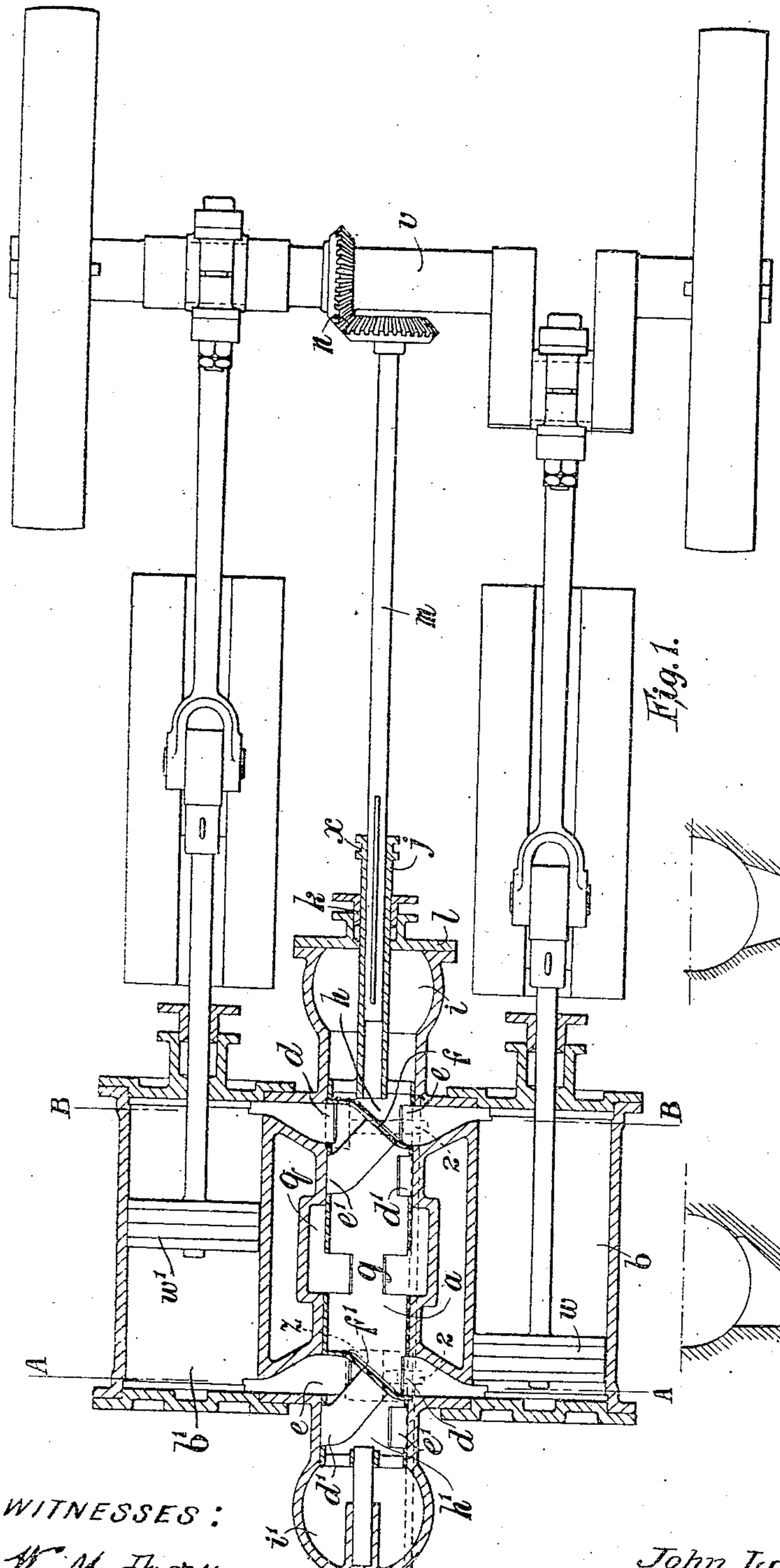

Fig. 1.

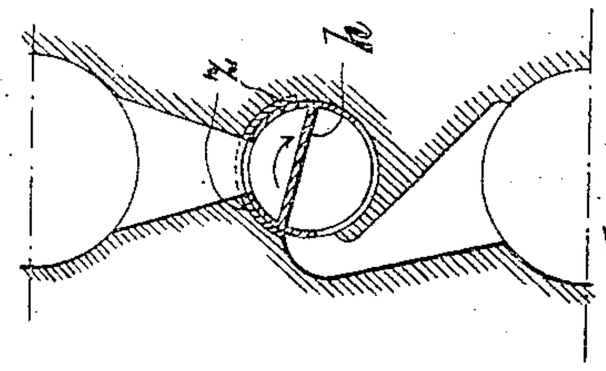

Fig. 3.

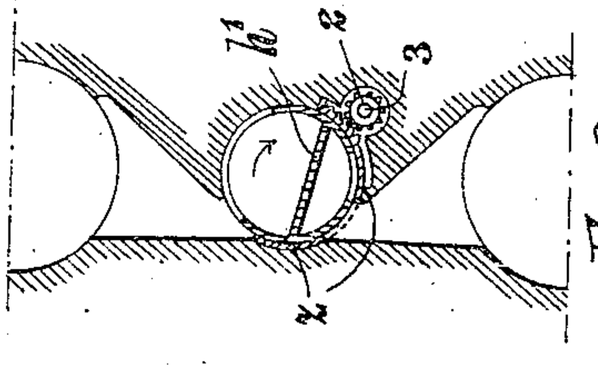

Fig. 2.

WITNESSES:

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JOHN IGNATIUS SHIRLEY, OF MEXICO, MEXICO.

ELASTIC-FLUID MOTOR.

958,553. Specification of Letters Patent. **Patented May 17, 1910.**

Application filed September 1, 1906. Serial No. 332,914.

To all whom it may concern:

Be it known that I, JOHN IGNATIUS SHIRLEY, a subject of the King of Great Britain and Ireland, and residing at the University Club of Mexico, 2ª Bucareli, No. 809, city of Mexico, Mexico, have invented certain new and useful Improvements in and Relating to Elastic-Fluid Motors, of which the following is a specification.

My invention relates to elastic fluid motors and has for its object to provide an elastic fluid motor having distributing valves and valve gear of simple construction and in which reciprocating motion of the valves is dispensed with.

My invention consists in an elastic fluid motor having a rotating distributing valve which is adapted by its rotation to supply working fluid to one or more cylinders and exhaust the working fluid therefrom in the proper sequence.

My invention further consists in the improved distributing valve and valve gear to be hereinafter described.

Referring now to the accompanying drawings which illustrate my invention and form part of my specification, Figure 1 shows a sectional plan of a motor constructed according to my invention; Fig. 2 shows a section through the line A A of Fig. 1, while Fig. 3 shows a section through the line B B of the same figure.

In carrying my invention into effect according to one mode and as applied to a double cylinder motor having cranks at right angles to one another, I arrange the distributing valve, *a*, between the two cylinders, *b*, and *b'*, as shown in Fig. 1. The distributing valve, *a*, is of tubular form and is provided with two sets of supply ports *d*, *d*, *d'*, *d'*, and two sets of exhaust ports, *e*, *e*, *e'*, *e'*. The ports, *d*, *e*, are for ahead working and the ports, *d'*, *e'* for reversing working. As the cranks are in the example shown at 90° the respective inlet ports are at 180° to the exhaust ports. Obviously when the ahead ports are in use the reversing ports are out of use and the change is effected by sliding the valve longitudinally as hereinafter described. The valve, *a*, is divided into three parts, *g*, *h*, and *h'* by the partitions, *f*, *f'* the part, *g*, in this instance being used as the supply chamber while the two chambers, *h*, *h'*, are connected with the exhaust ducts, *i* and *i'*. The valve, *a*, is actuated by a sleeve, *j*, which passes through the stuffing box, *k*, in the cover, *l*, of the chamber, *h*, and is capable of sliding longitudinally on a shaft *m* (driven from the crank shaft *v* through gear wheels *n* of equal diameter) so that it may be brought into the position required for either forward or reverse running. The valve may be slid by a forked lever engaging in a collar, *x*. The valve is caused to rotate with shaft *m* by a feather and slot connection. Pistons, *w* and *w'*, are disposed in the cylinders, *b* and *b'*, and actuate the crank shaft, *v*, through connecting rods, as usual.

The operation is as follows:—Steam or other fluid under pressure is introduced into the space, *q*, surrounding the distributing valve, and in the position shown in Fig. 1 (which shows the valve in the ahead position) passes directly into the central part, *g*, from which it passes through the supply ports, *d*, *d*, to the top of the cylinder, *b*, and to the bottom of the cylinder, *b'* while the top of the cylinder, *b'*, and the bottom of the cylinder, *b*, are in communication with the exhaust ducts, *i*, and *i'* through the chambers, *h*, and *h'*, the term "top of the cylinder" being used to denote that part of the cylinder remote from the crank shaft. When the engine is to be reversed the valve is slid longitudinally so that the inlet ports *d' d'*, deliver steam to the cylinders and the ports *e' e'* act as exhaust ports.

As the number of teeth in the gear wheels, *n*, are equal it follows that the valve rotates with the same angular velocity as the crank shaft, so that cut-off, expansion, release and compression take place in regular sequence, the ports in the valve being arranged to attain the desired amounts of expansion and compression.

To enable the cut-off to be varied the cylinder casing is fitted with cylindrical shutters, *z*, in positions opposite to the inlet ports of the cylinders so that the width of the same may be varied. The shutters are moved by pinions, 2, meshing with racks on the backs of the shutters the pinions being mounted on an operating spindle, 3. The spindle, 3, in the example shown is operated by hand but obviously it may be controlled by a governor, in any suitable manner.

Although the above example is described with reference to a motor having cranks at

right angles, by suitably modifying the position of the cylinder ports my invention may be applied to motors with the cranks set at an angle of 180°; also it will be obvious that my invention may also be adapted to single cylinder engines. In some cases I may lead the steam supply through the ends of the valve and allow the exhaust to take place from the center. I may also arrange the distributing valve for multiple expansion engines by arranging two intermediate chambers between the center and the end chamber and allow the exhaust from the high pressure cylinder to be distributed through such intermediate chambers to the low pressure cylinders, the exhaust from the low pressure cylinders being led to the exhaust through the ends of the valve in a similar manner to that hereinbefore described.

It will be seen that by employing a distributing valve such as I have hereinbefore described the construction of the motor is greatly simplified and a multiple cylinder engine has the working fluid distributed to all the cylinders by means of a single valve.

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

In a reversible fluid motor, the combination of a pair of cylinders, a valve chest between the cylinders, a rotary-tubular valve in said chest and having a central live steam chamber, exhaust chambers at each end of the valve, two sets of inlet and outlet ports at each end of the tubular valve, one set at each end being inoperative while the other is operating, ports in the cylinders adapted to intermittently coincide with the ports in the rotary valve, sloping partitions extending across the interior space of the valve and separating the inlet from the outlet of one set of ports, an exhaust pipe at each end of the valve extending through the partition at one end and the side wall of the valve at the other end, and means for longitudinally moving the valve to bring one or the other set of ports into operation.

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

JOHN IGNATIUS SHIRLEY.

Witnesses:

ANNA HAKIN,

SUSAN MCCREA.