

Aug. 24, 1926.

F. A. POLSLEY

1,597,542

MOTOR

Filed June 16, 1922

4 Sheets-Sheet 1

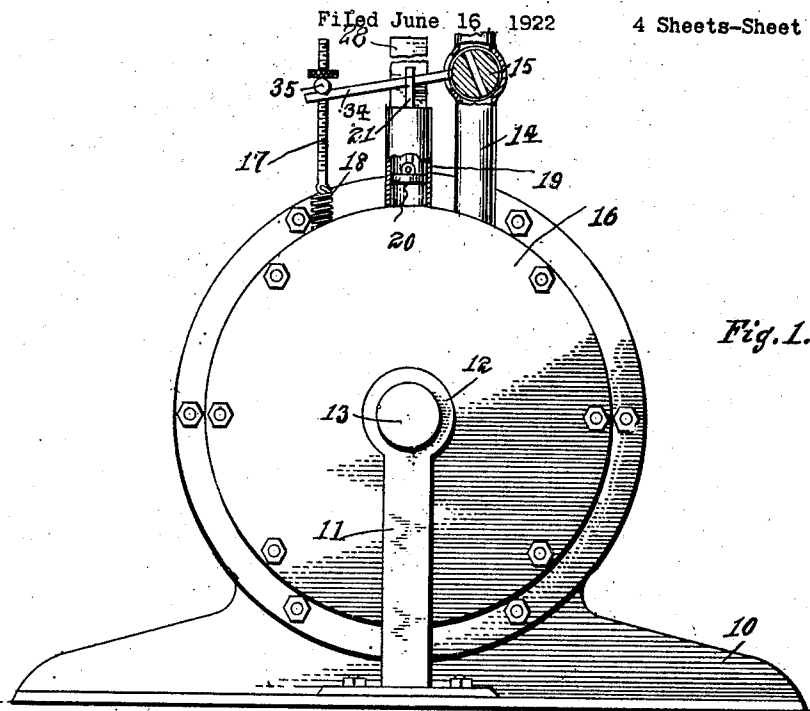


Fig. 1.

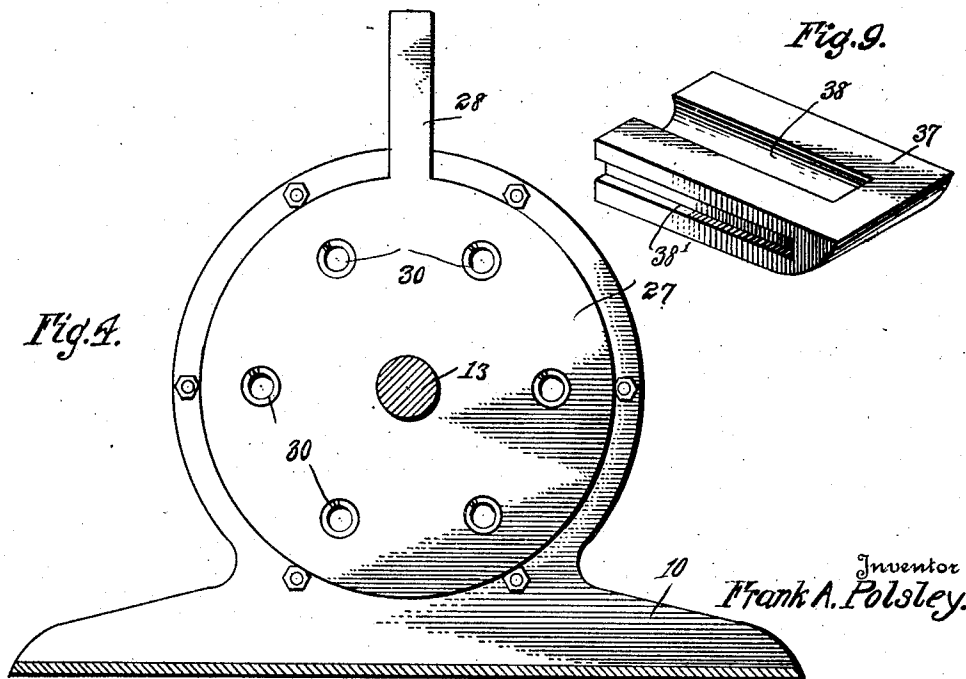


Fig. 4.

Fig. 9.

Witnesses
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384

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4 Sheets-Sheet 2

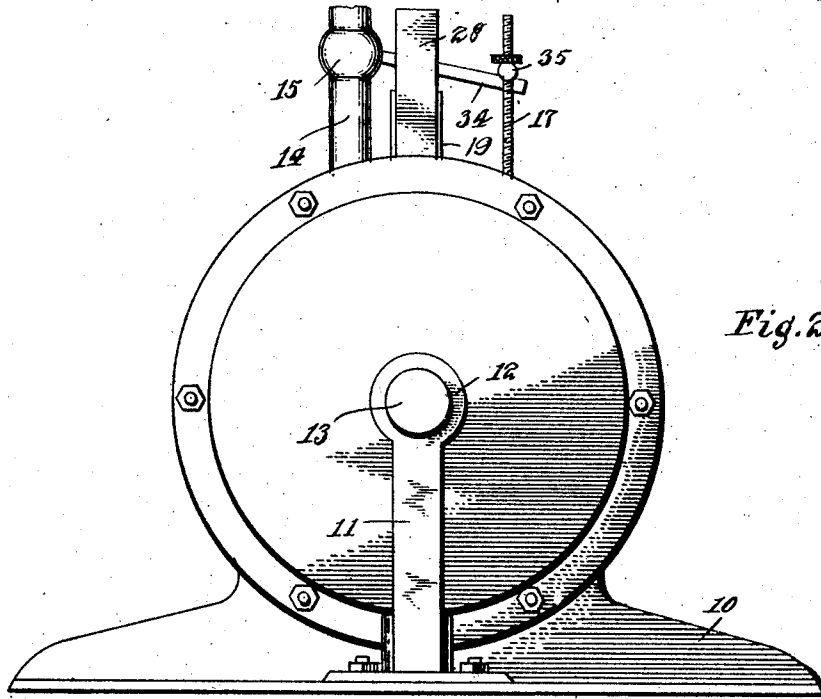


Fig. 2.

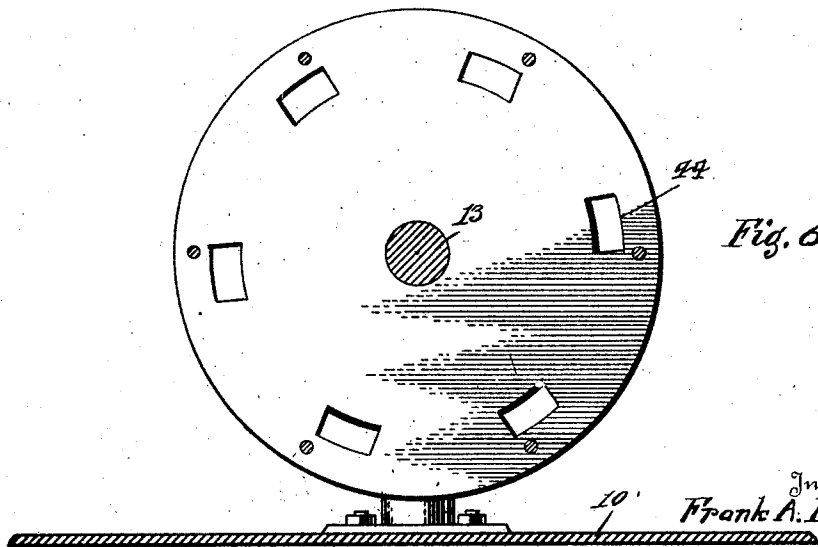


Fig. 6.

Witnesses.

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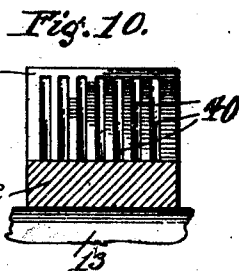
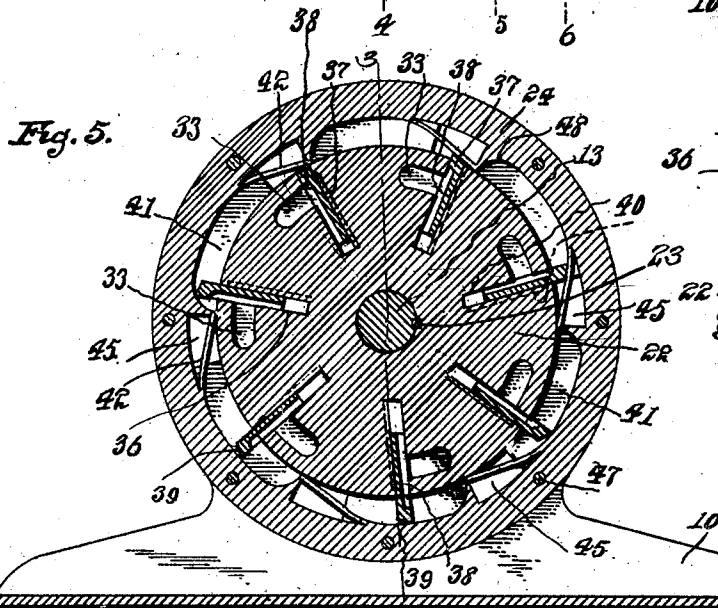
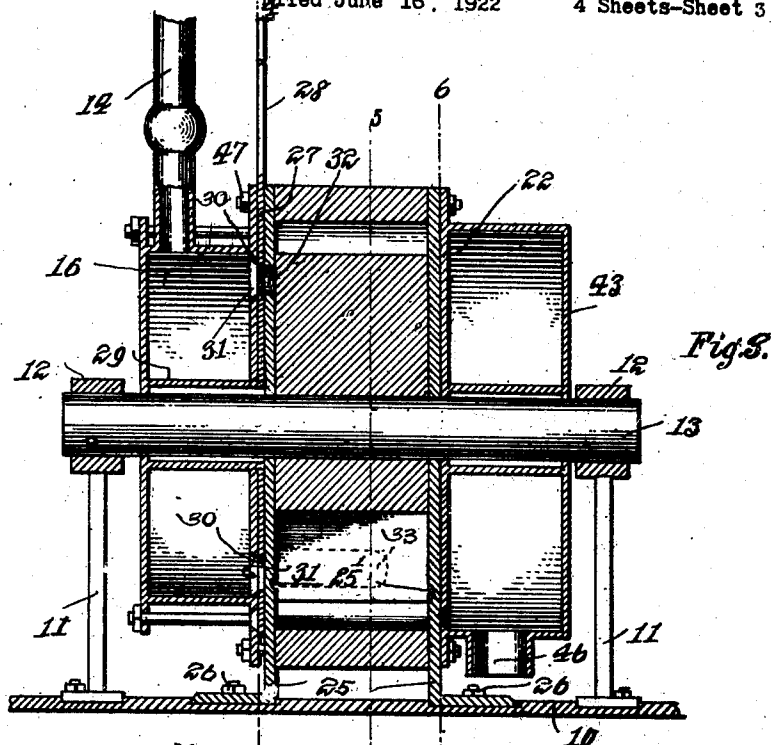
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1,597,542

MOTOR

Filed June 16, 1922

4 Sheets-Sheet 3



Witnesses
J. H. Layton
Frank Grace

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1,597,542

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MOTOR

Filed June 16, 1922

4 Sheets-Sheet 4

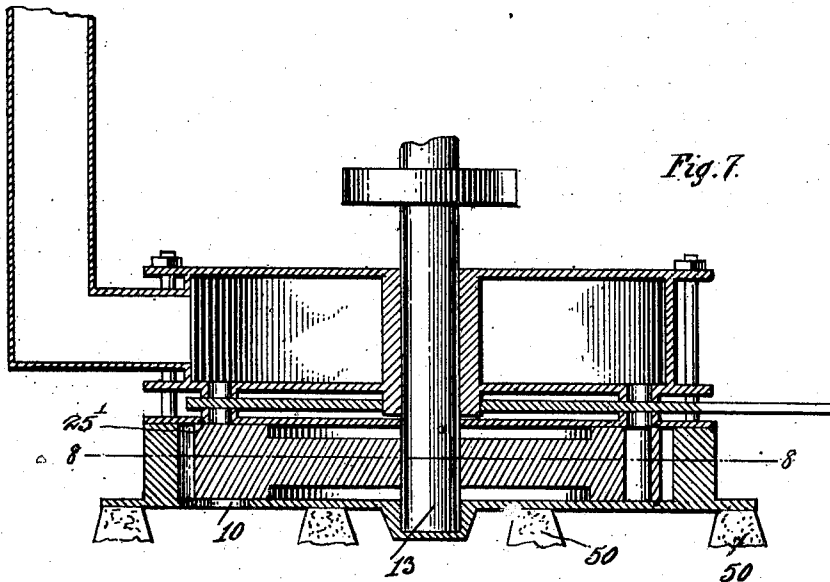


Fig. 7.

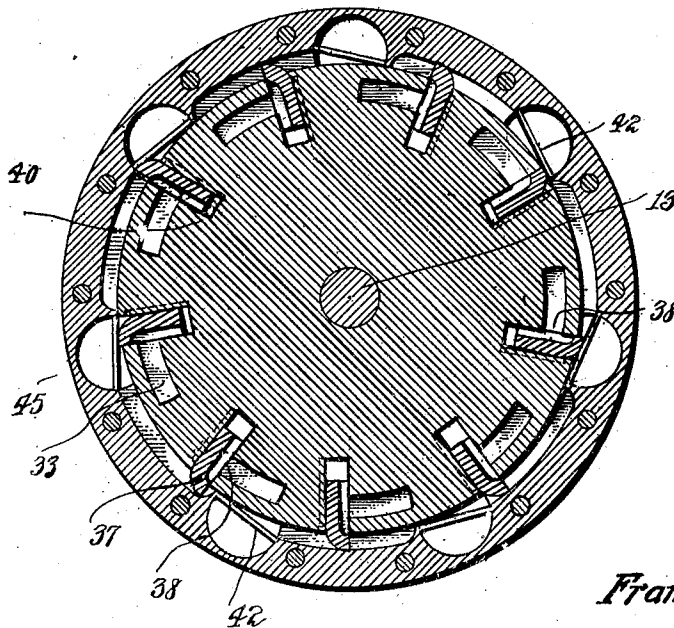


Fig. 8.

Witnesses
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Frank Fraser

Inventor
Frank A. Polsley

By Richard Blum

Attorney

UNITED STATES PATENT OFFICE.

FRANK A. POLSLEY, OF POINT PLEASANT, WEST VIRGINIA.

MOTOR.

Application filed June 16, 1922. Serial No. 568,806.

My invention relates to improvements in fluid pressure motors.

An object of my invention is to provide a motor economical in the consumption of the driving fluid.

Another object of my invention is to provide a motor capable of carrying the full load, from the moment of starting.

A further object of my invention is to provide a motor with a throttle, simple, easy of operation and with means of throttling to various speeds.

A still further object of my invention is to provide a motor having a pressure regulating chamber.

A still further object of my invention is to provide a motor, in which the old Vernier principle in mathematics is applied thereto.

A still further object of my invention is to provide a motor, compact, durable and inexpensive in construction whereby the number of working parts are reduced to a minimum.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of the specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a front elevation of an apparatus embodying my invention,

Figure 2 is a rear elevation of the same,

Figure 3 is a longitudinal section on line 3—3 of Fig. 5,

Figure 4 is a section taken on line 4—4 of Fig. 3,

Figure 5 is a section on line 5—5 of Fig. 3,

Figure 6 is a section on line 6—6 of Fig. 3,

Figure 7 is a vertical section of a modification of my invention,

Figure 8 is a horizontal section taken on line 8—8 of Fig. 7,

Figure 9 is a detail perspective of the piston used in my motor,

Figure 10 is a detail perspective of the rotor, illustrating cushion slots grooved in the wall of the piston slot.

In the drawings wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates a base upon which are mounted standards 11 provided with journals 12 to receive a shaft 13.

The numeral 14 designates a supply pipe, provided with a valve 15. The supply pipe 14 is connected to a pressure regulating

chamber or compartment 16. The pressure regulating chamber or compartment is provided with a supply governor comprising the valve 15, a lever 34 connected to the valve and adapted to open or close the valve, and an adjustable tension bar 17 mounted upon the top of the regulating chamber by means of a spring 18. The lever is adjusted on the tension bar 17 by means of a nut 35. The numeral 19 represents a cylinder connected to the supply regulating chamber and provided with a piston 20 to operate therein, said piston having the rod 21 to extend beyond the cylinder to engage, and acting as a push rod for the lever 34.

The numeral 22 designates a rotor keyed to shaft 13 by means of a key 23. This rotor is adapted to rotate within the stator, which embodies a cylindrical casing 24, the sides 25 of which are provided with annular oil grooves 25', and said casing is connected to the base 10 by the sides 25 and bolts 26. Mounted between the stator casing 24 and the pressure regulating chamber is a rotary disk or valve 27 provided with suitable operating means 28 as clearly shown in Fig. 4 of the drawing. The pressure regulating chamber 16 is provided with a sleeve 29 extending through the wall far enough to provide a seat for the rotary valve 27. The rotary valve has a series of ports 30 adapted to register with similar ports 31 in the pressure regulating chamber 16 and ports 32 in the stator casing 24.

The driving fluid is admitted through these ports into pockets 33 in the rotor. The pockets 33 are adjacent to and communicate with slots 36, said slots being adapted to receive sliding vanes or pistons 37. Each sliding vane or piston is provided with a longitudinal recess 38 as is clearly shown in Fig. 9 of the drawings. The driving pressure passes through the recess 38 in the end of the slot 36 thereby striking the ends of the sliding vanes or pistons 37 and forcing the same out. Each vane or piston is provided with a beveled end 39.

On the side edges of each sliding vane or piston, that is the faces that rub against the flat sides of the compartment, are provided with longitudinal slots 38' extending from the end adjacent the slot 36 almost to the beveled end 39 for the reception of a lubricant. Longitudinal grooves 40 are formed in the walls opposite the pocket 33 of the rotor 36 and extend almost to the rim of the rotor,

to permit the steam to enter therein to form a cushion to counterbalance the pressure in the pockets 33 so that the sliding vanes or pistons 37 can work freely in the slots 36.

5 The numeral 41 designates an expansion chamber provided with curved ends 48 having inclined abutments 42 for the beveled ends 39 of the sliding piston 37 to ride over. An exhaust chamber 43 is mounted adjacent
10 the rotor casing and is provided with exhaust ports 44 to register with similar ports 45 in the rotor casing. Leading from the exhaust chamber 43 is a pipe 46.

15 The pressure regulating chamber 16, the stator casing 24 and the exhaust chamber 43 are held together by bolts 47.

The device as described is adapted to be operated by steam, however, in Figs. 7 and 8 a slight modification is illustrated showing
20 the same device adapted to be operated by water. The construction of the device is practically the same except that the shape of various parts are modified to accommodate the use of water as a driving fluid.

25 In Fig. 7, the motor is shown mounted on a concrete base 50 and adapted to be operated by a vertical shaft instead of the horizontal shaft. The operation of the device, however, is identical, and therefore the description of the first type will suffice.

The operation of the device is as follows:

A driving fluid is introduced through the supply pipe 14 within the pressure regulating chamber 16. The amount admitted
35 is regulated by the valve 15 which is controlled by means of the lever 34 attached at its outer end to an adjustable tension bar 17. The lever is in turn operated by the push rod 21 which is the stem of said piston mounted in the cylinder 19 which is connected to the top of the pressure regulating chamber. Fluid acting on the piston has
40 a tendency to close the valve, whereas the action of the spring 18 of the tension bar has a tendency to keep the valve open. Therefore when the pressure becomes too great in the pressure regulating chamber, the piston will be forced upwardly to cause
45 the valve to be partially or totally closed until the pressure in the chamber is reduced when the piston will lower allowing the valve to open. In this way, by adjustment of the nut 35 on the piston rod any desired pressure may be maintained in the pressure
50 regulating chamber.

The driving fluid passes through the ports 31 in the side of the pressure chamber and ports 32 of the rotor casing. By movement
55 of the throttle, the amount of driving fluid admitted to the rotor is regulated. The steam or other driving fluid is admitted through these ports when they are in alignment, with the pockets 33 in the rotor 22. The ports are so arranged that steam can
60 enter these pockets when the sliding vanes

or pistons 37 are at the end of the inclined abutments 42 and the action of the steam in the recesses 38 will push the sliding pistons into contact with the perimeter of the stator casing. The action of the steam in the expansion chambers 41 will rotate the rotor,
70 and the sliding pistons will ride over the inclined abutments. The intake ports are so arranged that the same will be cut off from the pockets 33 before the steam is allowed to escape through the exhaust ports
75 45 to the exhaust chamber 43.

The inclined abutments force the sliding pistons back into the slots 36, into position for the operation to be repeated and to constitute a fulcrum for the pistons 37. It will
80 be noted that the different parts are so arranged that no two pistons are in the same relative position to the fulcrum at one time.

The application of the Vernier like principle in fixing the ratio of the number of fulcrums or sliding inclined abutments to the number of sliding vanes or pistons, and at the same time making them harmonize
85 and operate in perfect concert with all of the part of the motor in such a way as to increase its power over other well known types of motors well known to myself, is new, practical and advantageous.

It will be noted, in looking over the drawings that not a single sliding piston is in the same relative position to any of the remaining pistons to the fulcrums. In other words while one sliding piston is in an inactive or neutral position, all but one of the remaining ones are being driven on by the pushing of the steam or other power element, thereby multiplying or increasing the power over a one fulcrum engine by as many times
100 minus one as the number of fulcrums employed in the new form of motor. Such must always be the result because three hundred and sixty or the sum of the degrees in a complete circle is designedly made to be the least common multiple of the number of degrees subtending respectively, the arcs of two adjacent fulcrums and two adjacent
105 sliding pistons.

The advantage of this basic feature is obvious; and the design admits of employing as many or as few fulcrums as may be required to develop power required in the performance of the work for which any particular motor is built.

An advantage of this type of motor over both the steam and water turbine is this, namely: that the turbine can not carry its load until after first gaining great speed, which speed it must hold and at the expense of an immense quantity of driving power; whereas my new motor may take up and carry the full load from the very start, and that, whether running very slow or at full speed.

The speed of the motor is regulated by 120

the rotary valve or throttle 27. This motor can be adapted to be operated by water or compressed air, as well as steam by modifying the shape of the various parts as shown in Figs. 7 and 8 of the drawings.

It is to be understood that the form of my invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention what I claim is:

1. A rotary motor comprising a stator, including an outer annular wall having a plurality of equidistantly spaced expansion chambers each terminating in an abruptly enlarged portion, inclined abutments formed on the inner surface of the wall at said chamber and disk-shaped side walls having inlet and outlet ports formed therein arranged in annular formation, a rotor mounted within the stator, a plurality of sliding vanes carried by the rotor, a steam chamber carried by one side wall and housing said ports, means for supplying steam to said chamber, a rotary valve disposed between the steam chamber and the stator having a plurality of openings therein for

controlling the flow of steam through said ports, means for operating said valve, an exhaust chamber carried by the other side wall of the stator and housing said outlet ports, and an outlet pipe carried by said chamber.

2. A rotary engine comprising a stator including side walls, having inlet and outlet ports formed therein respectively and arranged in annular formation, and an outer annular wall having a plurality of equidistantly spaced expansion chambers, each terminating in an abruptly enlarged portion, inclined abutments arranged at the enlarged terminals of the expansion chambers, a rotor disposed in said stator having pockets formed in one of the side faces arranged to communicate with the inlet ports, and radially extending slots communicating with the pockets, vanes slidably mounted within the said slots having ways therein communicating with said pockets for permitting the flow of the operating fluid from the pockets into the expansion chambers, and inlet and outlet chambers carried by the side walls of the stator and housing said inlet and outlet ports.

In testimony whereof I affix my signature.

FRANK A. POLSLEY.