

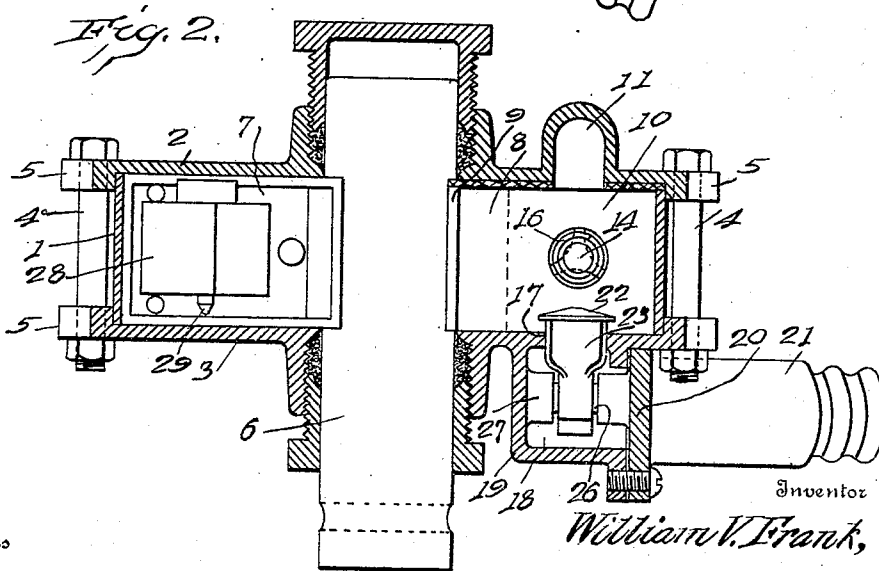
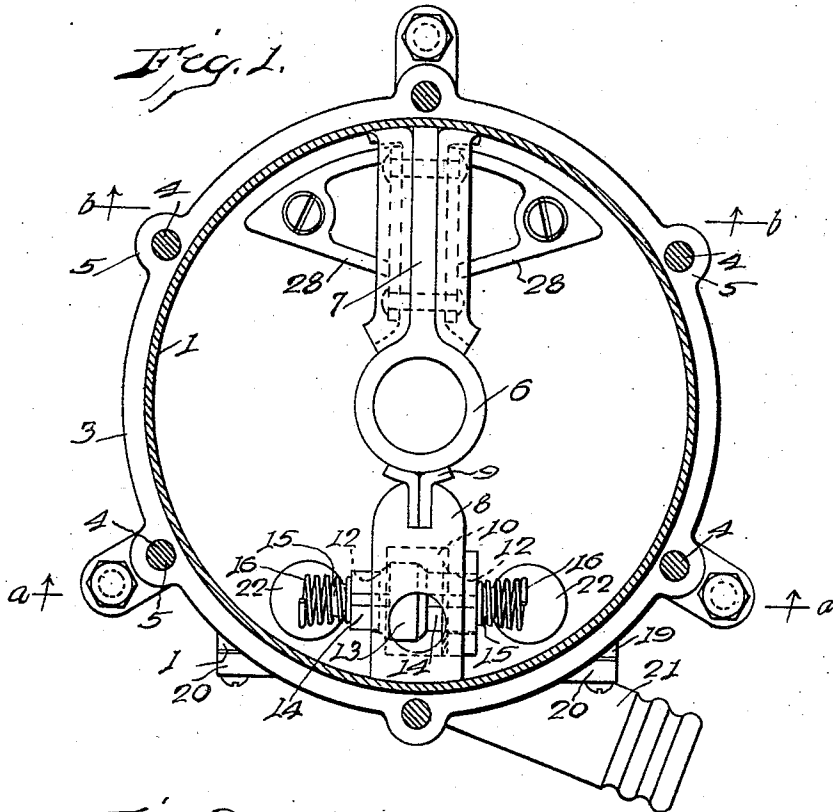
W. V. FRANK.
OSCILLATING MOTOR.

APPLICATION FILED SEPT. 4, 1909. RENEWED JULY 22, 1910.

969,532.

Patented Sept. 6, 1910.

3 SHEETS—SHEET 1.



Witnesses

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Edward A. Reed.

Inventor
William V. Frank,

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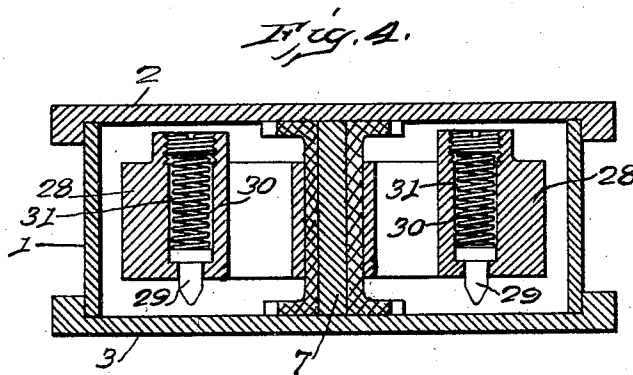
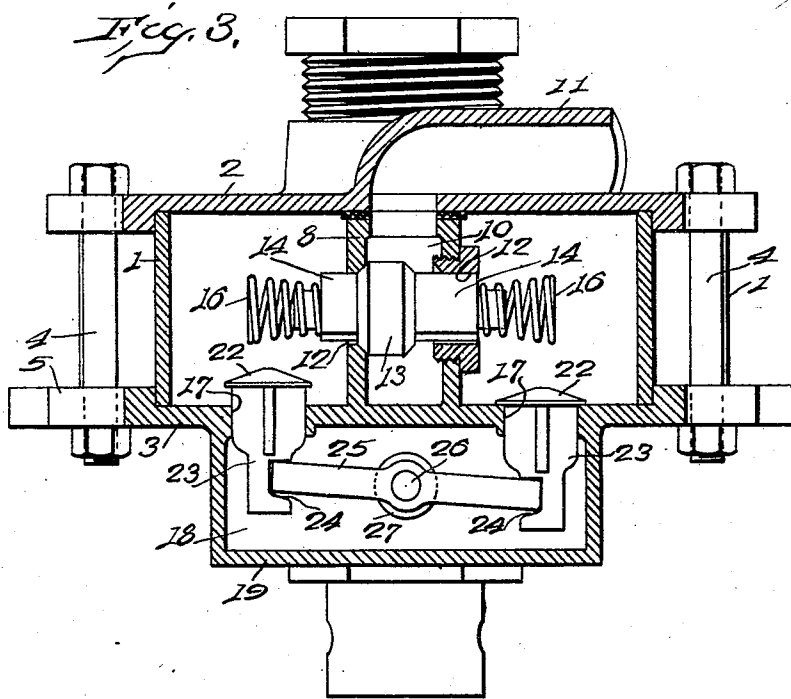
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLIAM V. FRANK, OF SPRINGFIELD, OHIO.

OSCILLATING MOTOR.

969,532.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed September 4, 1909, Serial No. 516,295. Renewed July 22, 1910. Serial No. 573,284.

To all whom it may concern:

Be it known that I, WILLIAM V. FRANK, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Oscillating Motors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to oscillating motors, and the object of the same is to provide a motor of this character having a long powerful piston stroke; having the inlet and exhaust valves so arranged as to enable a large inlet port to be employed without increasing the size of the motor casing; and further, to provide a motor of this character which will be simple in its construction and operation.

With these objects in view my invention consists in certain novel features and in certain combinations and arrangements of parts hereinafter to be described, and then more particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a top, plan view of a motor embodying my invention, with the upper cylinder head removed; Fig. 2 is a vertical section, taken centrally through the motor, showing the piston and abutment in elevation; Fig. 3 is a vertical section, taken on the line *a a* of Fig. 1; and Fig. 4 is a similar section, taken on the line *b b* of Fig. 1.

In these drawings I have illustrated one embodiment of my invention and have shown the same as comprising a cylinder consisting of the usual cylindrical casing 1 and the cylinder heads 2 and 3 which are connected one to the other and to the cylindrical casing by means of bolts 4 extending through apertured lugs 5 carried by the upper and lower cylinder heads. A motor shaft 6 is journaled in the cylinder heads and carries a piston 7 which is adapted to move freely in the chamber formed within the cylinder.

A radially arranged abutment 8 is rigidly mounted within the cylinder and is provided at its inner edge with packing 9 to form a water-tight contact between the abutment and the shaft 6 which will permit a free movement of the shaft. A chamber 10 is formed within the abutment and is connected with an inlet pipe 11 which is preferably formed integral with the upper cyl-

inder. The inlet chamber 10 communicates with the interior of the cylinder on opposite sides of the abutment 8 by means of ports 12, which ports are controlled by a double acting valve 13 mounted within the chamber 10 and having guides 14 extending through the ports 12. Pins 15 are secured to and preferably formed integral with the guides 14 and have springs 16 secured thereto.

The cylinder has exhaust ports arranged on opposite sides of the abutment 8, and, in the present instance, these ports are shown as formed in the lower cylinder head 3, as shown at 17, and connect the chamber within the cylinder with an outlet chamber or compartment 18 formed within a casing 19 carried by the lower cylinder head and preferably cast integral therewith. One wall of the casing 19 is removable, as shown at 20, and has secured thereto the exhaust pipe which communicates with the exhaust chamber 18. The exhaust ports 17 are controlled by exhaust valves 22 arranged to seat against the cylinder head at the inner ends of the ports and having stems 23 extending through the ports and into the chamber 18 where they are provided in their adjacent edges with slots 24 adapted to receive the ends of a lever or arm 25 which is pivotally mounted on the wall of the casing 19 midway between the two valve stems. The arm is preferably mounted on the wall of the casing 19 by means of pivot pins or trunnions 26 journaled in bearings 27 carried by the front and rear walls of the casing 18. This construction enables the arm to be readily removed when the front wall 20 of the casing has been removed, thereby permitting the valves 22 to be withdrawn. The arrangement of the arm 25 and the manner of its connection to the valve stems 23 is such that, when one valve is closed, the other will be open. Both the exhaust valves and the inlet valve are actuated by the movement of the piston 7 and, to this end, the piston is, in the present instance, provided on its opposite sides with projections or wings 28 having their front faces arranged to engage the springs 16 mounted on the guides 14 of the inlet valve 13 and thus operate this valve in the usual manner. A part carried by each of the projections or wings 28 is arranged at such a height from the lower cylinder head that it will engage the adjacent valve 22 when that valve is in its open position and seat the

same. In order to throw these valves across their dead-center, it is desirable that the part which actuates the same should be spring-pressed, and, to this end, I have mounted a vertically arranged pin 29 in each of the wings 28, which pins are held normally in their lowermost position by springs 30 confined within a vertically arranged recess or guideway 31 formed in each wing. The lower ends of the pins 29 are preferably tapered or inclined to coöperate with the inclined or conical upper surfaces of the valves 22. As the piston approaches the abutment, the lower end of the pin 29 will engage the inclined face of the adjacent valve 22, which is in its open position. The pressure of the water on the other valve 22 will tend to hold both the valves against movement and the spring 30 will be compressed until the tension is sufficient to overcome the water pressure, when the valves will be shifted and the expansion of the spring 30 will be sufficient to throw the valves across their dead-center.

The operation of the motor will be readily understood from the foregoing description, and it will be apparent that, by arranging the exhaust valves in the cylinder head on opposite sides of the abutment, I am enabled to form a large inlet port within the abutment and thereby increase the flow of water to the cylinder without increasing the size of the cylinder. Further, it will be apparent that this is accomplished in such a manner as to permit of a long stroke of the piston; and that the device as a whole is very simple, both in its construction and in its operation.

I wish it to be understood that I do not desire to be limited to the details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

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

1. In an oscillating motor, the combination, with a cylinder, a shaft journaled therein, and a piston carried by said shaft, of an abutment having inlet ports formed therein and communicating with the interior of the cylinder on opposite sides thereof, a double acting valve to control said ports, exhaust ports formed in said cylinder on opposite sides of said abutment, exhaust valves controlling said exhaust ports, and means actuated by the movement of said piston for shifting said exhaust valves.

2. In an oscillating motor, the combination, with a cylinder, a shaft journaled therein, and a piston carried by said shaft, of an abutment having inlet ports formed therein and communicating with the interior of the cylinder on opposite sides thereof, a double acting valve to control said ports, exhaust ports formed in said cylinder on op-

posite sides of said abutment, exhaust valves controlling said exhaust ports, and a part carried by said piston adapted to engage one of said exhaust valves and reverse the positions of both of said exhaust valves.

3. In an oscillating motor, the combination, with a cylinder, a shaft journaled therein, and a piston carried by said shaft, of an abutment having inlet ports formed therein and communicating with the interior of the cylinder on opposite sides thereof, a double acting valve to control said ports, exhaust ports formed in said cylinder on opposite sides of said abutment, exhaust valves controlling said exhaust ports, and a spring-pressed part carried by said piston and adapted to engage one of said exhaust valves and reverse the positions of both of said exhaust valves.

4. In an oscillating motor, the combination, with a cylinder, a shaft journaled therein, and a piston carried by said shaft, of an abutment having inlet ports formed therein and communicating with the interior of the cylinder on opposite sides thereof, a double acting valve to control said ports, exhaust ports formed in said cylinder on opposite sides of said abutment, exhaust valves controlling said exhaust ports and connected one to the other to cause the same to move in unison in opposite directions, said exhaust valves having inclined surfaces, and spring-pressed pins carried by said piston and having inclined lower ends, each adapted to engage the inclined surface of the respective exhaust valve when said exhaust valve is in its open position.

5. In an oscillating motor, the combination, with a cylinder comprising a casing, cylinder heads secured thereto, a shaft journaled in said cylinder heads, and a piston carried by said shaft, of an abutment arranged within said cylinder and having inlet ports communicating with the interior of said cylinder on opposite sides of said abutment, a double acting valve for controlling said inlet ports, exhaust ports formed in one of said cylinder heads on opposite sides of said abutment, exhaust valves for controlling said exhaust ports having inclined upper surfaces and connected one to the other to cause the same to move in unison in opposite directions, projections secured to the opposite sides of said piston, and a spring-pressed part carried by each of said projections and adapted to engage the corresponding exhaust valve as the piston approaches the abutment on the side of that exhaust valve.

6. In an oscillating motor, the combination, with a cylinder comprising a casing, cylinder heads secured thereto, a shaft journaled in said cylinder heads, and a piston carried by said shaft, of an abutment arranged within said cylinder and having in-

let ports communicating with the interior of said cylinder on opposite sides of said abutment, a double acting valve for controlling said inlet ports, exhaust ports 5 formed in one of said cylinder heads on opposite sides of said abutment, exhaust valves for controlling said exhaust ports, having inclined upper surfaces and connected one to the other to cause the same to 10 move in unison in opposite directions, projections secured to the opposite sides of said piston and adapted to actuate said inlet valve and having a vertically arranged spring-pressed pin mounted therein, said 15 pins having inclined lower ends to cooperate with the inclined surfaces of said exhaust valves.

7. In an oscillating motor, the combination, with a cylinder, a shaft journaled 20 therein, and a piston carried by said shaft, of an abutment having inlet ports communicating with the interior of said cylinder on opposite sides thereof, a valve for controlling said ports, a casing secured to the outer 25 side of said cylinder and connected with an exhaust pipe, exhaust ports formed in said cylinder on opposite sides of said abutment and communicating with the interior of said

casing, and exhaust valves for controlling said exhaust ports.

8. In an oscillating motor, the combination, with a cylinder comprising a casing, 30 cylinder heads secured thereto, a shaft journaled in said cylinder heads, and a piston secured to said shaft, of an abutment mounted 35 within said cylinder and having inlet ports communicating with the interior of said cylinder on opposite sides of said abutment, a double acting valve controlling said ports, a casing secured to one of said cylinder heads, 40 having a removable wall and connected with an exhaust pipe, exhaust ports formed in said cylinder head on opposite sides of said abutment and communicating with said casing, exhaust valves for controlling said ex- 45 haust ports, means located within said casing for connecting said exhaust valves one to the other to cause the same to move simultaneously in opposite directions, and means carried by the piston for actuating said valves. 50

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

WILLIAM V. FRANK.

Witnesses:

E. O. HAGAN,

EDWARD L. REED.