

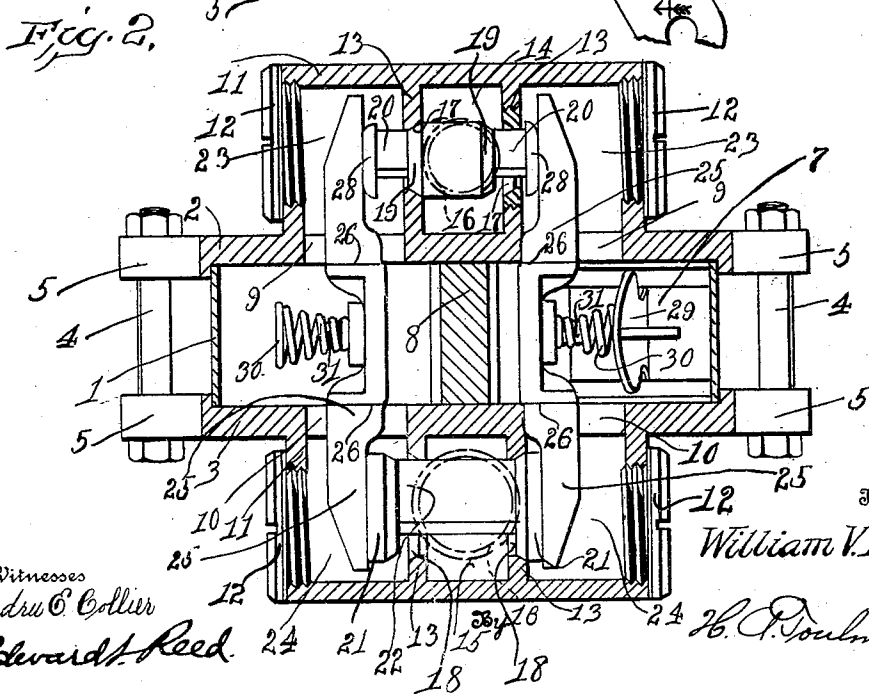
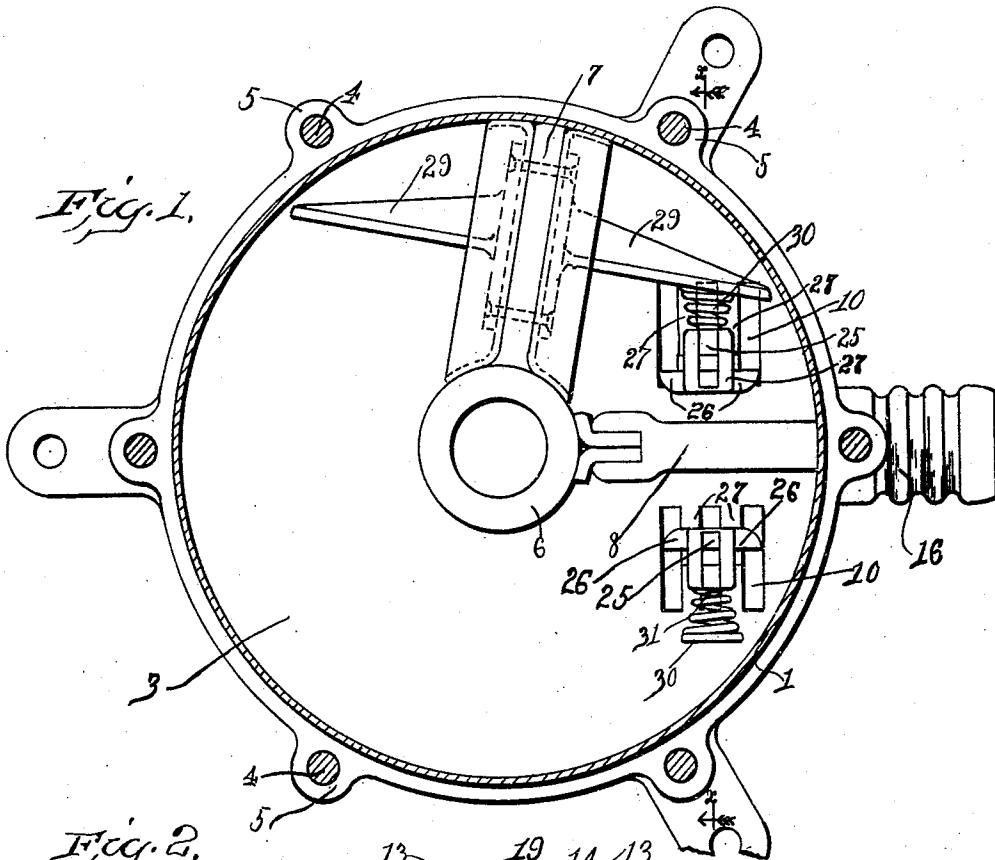
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MOTOR.

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969,467.

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MOTOR.

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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 Motors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to motors, and more particularly to water motors of the oscillating type.

The object of the invention is to provide a motor of this type which will be quick in its action, will have a long powerful stroke and will be simple and inexpensive in its construction.

To this end it is a further object of the invention to mount the valves controlling the inlet and exhaust of the fluid upon the exterior of the motor casing and to control these valves by the action of the piston.

In the accompanying drawings, Figure 1 is a top, plan view of a motor embodying my invention, with the upper cylinder head removed; and Fig. 2 is a sectional view, taken on the line *x x* of Fig. 1 and looking in the direction of the arrows.

In these drawings I have illustrated one embodiment of my invention and have shown the same as applied to a motor comprising a motor casing which consists of a body portion or cylinder 1 and cylinder heads 2 and 3. These cylinder heads are rigidly secured one to the other by means of bolts 4 extending through apertured lugs 5 carried by the respective cylinder heads. A shaft 6 is journaled in the upper and lower cylinder heads and has rigidly secured thereto a piston 7. An abutment 8 is rigidly secured to the cylinder and extends between the same and the shaft 6. Each cylinder head 2 and 3 has openings 9 and 10, respectively, formed therein on opposite sides of the abutment 8, these openings constituting the inlet and exhaust openings for the motor. A casing 11 is rigidly secured to each cylinder head, and, in the present instance, is shown as formed integral therewith. This casing is of a length sufficient to inclose the openings in the respective cylinder head and preferably has its ends closed by screw caps 12 to permit ready access to the interior of the casing. The interior of each casing is divided by partitions 13 into three chambers. The central chamber 14 in

the casing carried by the upper cylinder head is connected with a suitable source of fluid supply, while the central chamber 15 in the casing carried by the lower cylinder head is connected with the exhaust, these connections being here shown as formed by means of nipples 16 communicating with the respective chambers 14 and 15. The chambers 14 and 15 constitute valve chambers and the partitions 13 have ports 17 and 18, respectively, formed therein. Inlet valves 19 are mounted in the chamber 14 and are adapted to engage valve seats formed in the adjacent sides of the partitions 13. In the present instance, these valves are shown as comprising a single member having its opposite ends shaped to engage the respective valve seats and thus constitute the two valves. Valve stems 20 extend through the ports 17 and form guides which serve to support and guide the valve member. The ports 18 in the partitions 13 of the casing carried by the lower cylinder head are controlled by exhaust valves 21 which are arranged to engage valve seats formed in the outer sides of the partitions 13. The valve members are connected by a stem or guide 22 extending through the ports 18 in the partitions and supporting and guiding the valves in proper relation to the valve seats. The ports 17 and 18 in the partitions 13 communicate with the interior of the cylinder and the valves are so controlled that the valve chamber 14 and the valve chamber 15 will be at all times in communication with the interior of the cylinder on opposite sides of the abutment 8. In the present instance the partitions 13 in the respective casings 11 are so arranged as to form inlet and exhaust chambers 23 and 24, respectively, each inlet chamber being in communication with the interior of the motor casing by means of one of the openings 9 in the upper cylinder head and each outlet chamber 24 being in communication with the interior of the casing by means of one of the openings 10 in the lower cylinder head.

The valves 19 and 21 are controlled by the movement of the piston 7, and, in the present instance, this is accomplished by means of valve-shifting members or bars 25 mounted within the motor casing on either side of the abutment 8 and extending into the inlet and exhaust chambers on the corresponding sides of the abutment. These

valve shifting members or bars may be supported within the interior of the motor casing in any suitable manner, but I have here shown each member as having shoulders 26 adapted to engage guides 27 extending across the respective openings 9 and 10, through which the valve-shifting member extends. As here shown the guides 27 comprise bars extending across the respective openings 9 and 10 in the direction of movement of the valve members. There are two of these bars for each opening and they form between them a slot through which the valve-shifting member extends. The shoulders 26 adjacent the lower cylinder head rest upon the guides of the adjacent opening and support the member thereon, while the shoulders 26 adjacent the upper cylinder head are so arranged relative to the guides 27 that they prevent the member from tipping and thus maintain the same in a substantially vertical position. Those portions of the valve-shifting members or bars 25 which extend into the respective inlet and exhaust chambers are arranged to engage the adjacent ends of the valve members or their guides. In the present instance the guides or valve stems 20 of the inlet valve are provided with buttons 28 on their outer ends to insure a perfect contact between the same and the actuating members. Those portions of the valve-shifting members which lie within the motor casing proper are arranged in the path of the piston 7 and are adapted to be actuated by the movement of that piston. As here shown the piston itself does not engage the valve-shifting member, but has extending from each side thereof an arm or plate 29 arranged to engage a spring 30 mounted on a pin 31 extending from that side of the valve-shifting member opposite the abutment. Thus, as the piston approaches the limit of its movement in one direction the arm 29 will engage the spring 30 of the corresponding valve-shifting member and will move the valve-shifting member toward the abutment, thereby simultaneously shifting the positions of both the inlet and exhaust valves and reversing the direction of flow of the water or other actuating fluid.

As will be apparent from the drawings and the foregoing description the arrangement of the inlet and exhaust valves on the exterior of the motor casing enable me to make that casing of a comparatively shallow depth, thereby materially reducing the amount of water which must enter the casing before the piston will start or will reverse its movement. Consequently, the action of the motor is quickened by thus reducing the depth of the motor. Further, this arrangement allows a long movement of the piston and this movement can be varied by altering the size and arrangement

of the arms 29 which engage the springs of the valve-shifting members. It will also be apparent that by arranging the valves in chambers upon the exterior of the motor casing instead of within the abutment, they are more readily accessible and access may be had thereto without disassembling the motor casing. Further, the construction is a very simple one, the number of parts employed being small and the arrangement of these parts being such that they cannot easily become disarranged or broken.

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:—

1. In a motor of the character described, the combination, with a motor casing comprising a cylinder and cylinder heads, said cylinder heads having openings therein, and a piston mounted in said casing, of valves mounted on the exterior of said cylinder heads and arranged to control the flow of fluid through the respective openings.

2. In a motor of the character described, the combination, with a motor casing having openings therein, supplemental casings mounted on said motor casing and inclosing said openings, and a piston mounted within said casing, of valves mounted wholly on the exterior of said motor casing, within said supplemental casings, and arranged to control the flow of fluid through the respective openings, and valve shifting members actuated by said piston for controlling the positions of said valves.

3. In a motor of the character described, a motor casing comprising a cylinder and cylinder heads, a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, one of said cylinder heads having openings therein on opposite sides of said abutment, valves for controlling the flow of fluid through said openings, the other of said cylinder heads also having an opening therein, and means for controlling the flow of fluid through said opening.

4. In a motor of the character described, the combination, with a motor casing comprising a cylinder and cylinder heads, of a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, said cylinder heads each having openings therein arranged on the opposite sides of said abutment, and valves for controlling the flow of fluid through said openings.

5. In a motor of the character described,

the combination, with a motor casing comprising a cylinder and cylinder heads, of a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, said cylinder heads each having openings therein arranged on the opposite sides of said abutment, valves for controlling the flow of fluid through said openings, and means actuated by the movement of said piston for controlling the positions of said valves.

6. In a motor of the character described, the combination, with a motor casing comprising a cylinder and cylinder heads, of a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, said cylinder heads each having openings therein arranged on opposite sides of said abutment, valves for controlling the flow of fluid through said openings, and means for simultaneously actuating said valves.

7. In a motor of the character described, the combination, with a motor casing comprising a cylinder and cylinder heads, of a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, said cylinder heads each having openings therein arranged on opposite sides of said abutment, valves for controlling the flow of fluid through said openings, and valve-shifting members mounted within said motor casing on opposite sides of said abutment, arranged to be actuated by the movement of said piston and operatively connected with said valves.

8. In a motor of the character described, a motor casing comprising a cylinder and cylinder heads, a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, a casing mounted on each of said cylinder heads and having a valve chamber within the same, said valve chamber being in communication with the interior of said motor casing on each side of said abutment, valves mounted in said valve chambers, and means actuated by the movement of said piston for controlling the position of said valves.

9. In a motor of the character described, a motor casing comprising a cylinder and cylinder heads, a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, a casing mounted on each of said cylinder heads, each of said casings having a valve chamber and a valve mounted therein, the valve chamber in each of said casings being in communication with the interior of said motor casing on opposite sides of said abut-

ment, and the valve chamber of one of said casings being in communication with the source of fluid supply, the valve chamber of the other of said casings being in communication with an exhaust, and valve actuating members mounted within said motor casing, arranged to be actuated by the movement of said piston and operatively connected to said valve members.

10. In a motor of the character described, a motor casing comprising a cylinder and cylinder heads, a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, a casing mounted on each of said cylinder heads, each of said casings having a valve chamber and a valve mounted therein, the valve chamber in each of said casings being in communication with the interior of said motor casing on opposite sides of said abutment, and the valve chamber of one of said casings being in communication with the source of fluid supply, the valve chamber of the other of said casings being in communication with an exhaust, and a valve-shifting bar extending through said motor casing on each side of said abutment, each of said bars having its opposite end extending into the respective casings and arranged to operate the valve mounted therein.

11. In a motor of the character described, the combination, with a motor casing comprising a cylinder and cylinder heads, a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, a casing mounted on each of said cylinder heads and having a valve chamber therein, a valve mounted in each of said valve chambers, each of said cylinder heads having openings therein arranged on opposite sides of said abutment and connecting the interior of said motor casing with the interior of the respective casing on the opposite sides of the valve chamber therein, valve-shifting members extending through the openings in said cylinder heads into the respective casings, and guides carried by said cylinder heads for supporting said valve-shifting members in their proper positions.

12. In a motor of the character described, the combination, with a motor casing comprising a cylinder and cylinder heads, a shaft journaled in said cylinder heads, a piston carried by said shaft, an abutment arranged between said shaft and the wall of said cylinder, a casing mounted on each of said cylinder heads and having a valve chamber therein, a valve mounted in each of said valve chambers, each of said cylinder heads having openings therein arranged on opposite sides of said abutment and connecting the interior of said motor casing

with the interior of the respective casing on
the opposite sides of the valve chamber
therein, valve-shifting members extending
through the openings in said cylinder heads
5 into the respective casings, guide bars ex-
tending across the openings in said cylin-
der heads, and parts carried by said valve-
shifting members to engage and cooperate

with said guide bars and support said valve-
shifting members in their proper positions. 10

In testimony whereof, I affix my signa-
ture in presence of two witnesses.

WILLIAM V. FRANK.

Witnesses:

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EDWARD L. REED.