L. S. RIZER.

OSCILLATING MOTOR.

APPLICATION FILED MAR. 26, 1908.

967,560.

Patented Aug. 16, 1910.

2 SHEETS—SHEET 1.

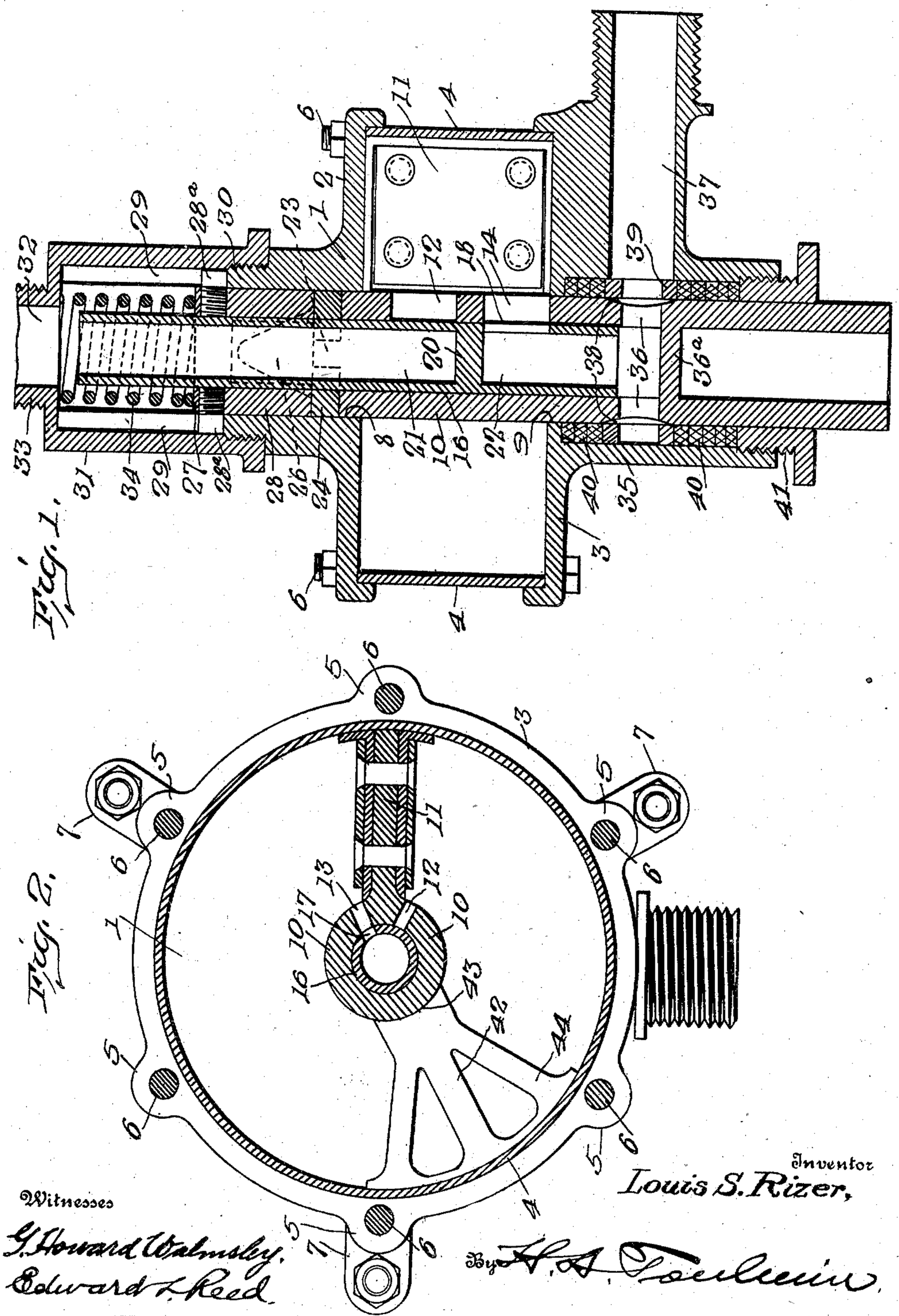

Fig. 1.

Fig. 2.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

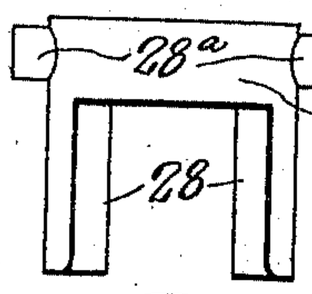


Fig. 4.

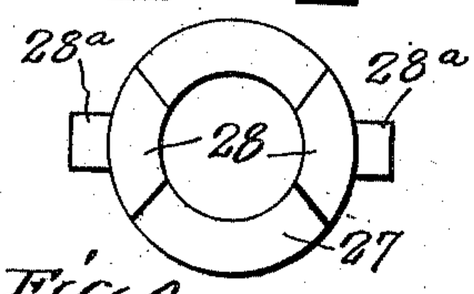


Fig. 6.

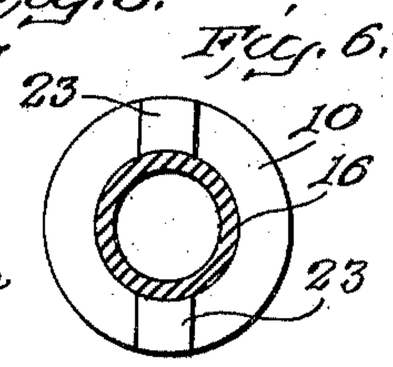


Fig. 12.

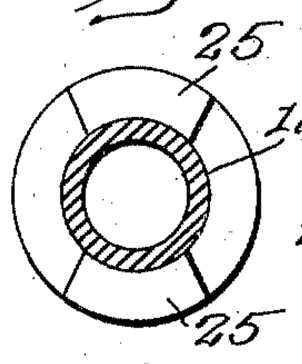


Fig. 13.

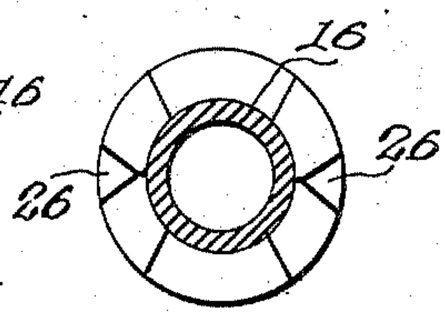


Fig. 7.

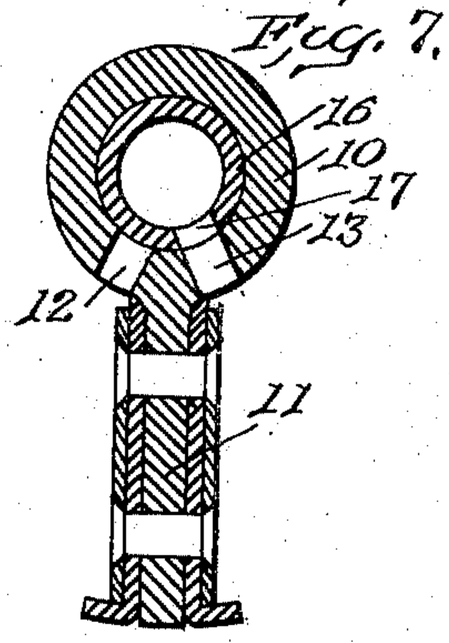


Fig. 8.

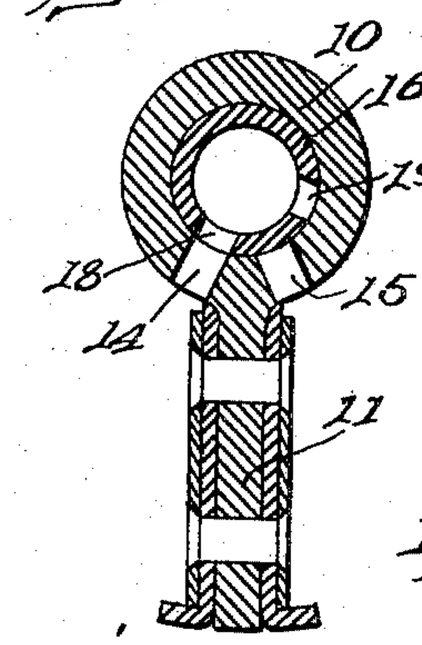


Fig. 10.

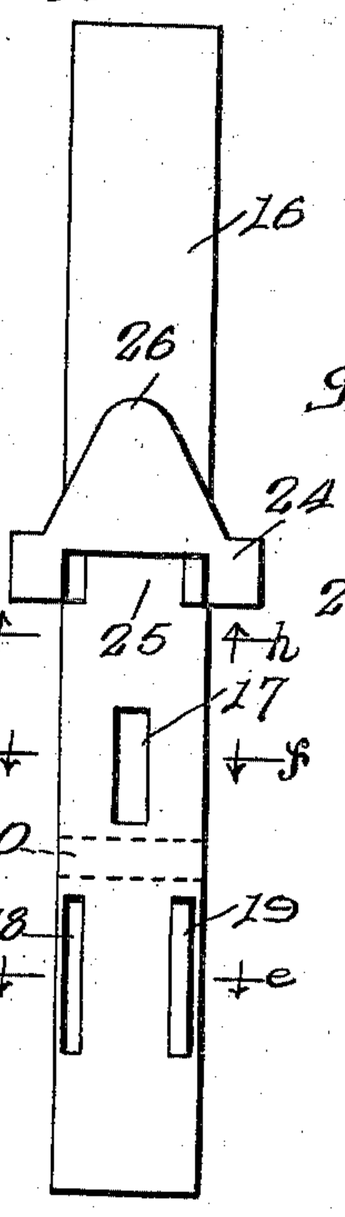


Fig. 11.

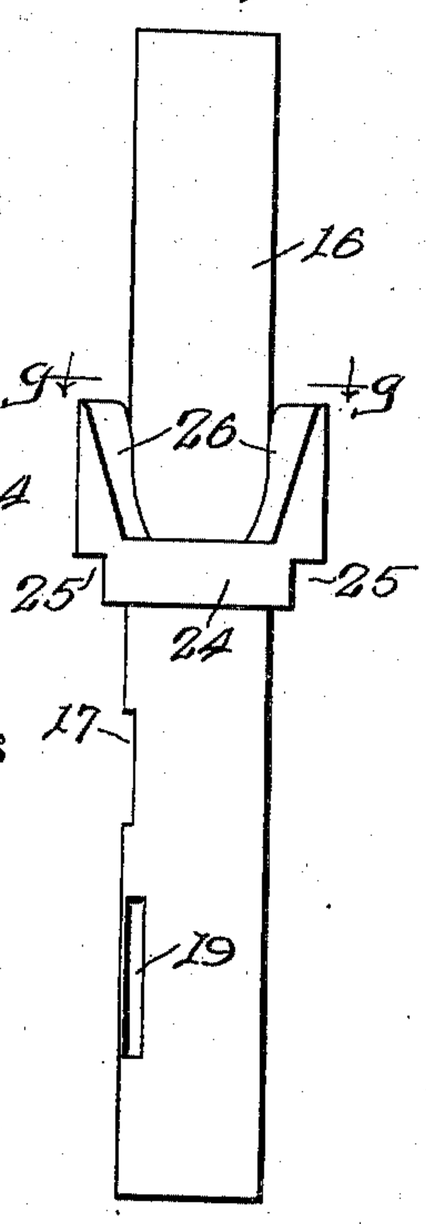


Fig. 5

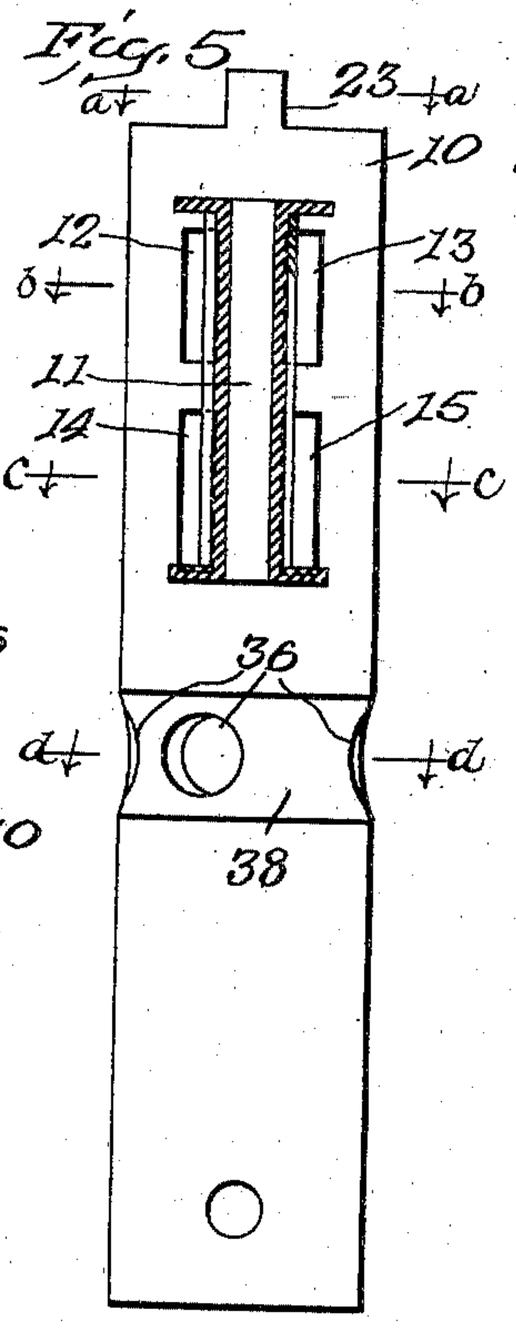


Fig. 9.

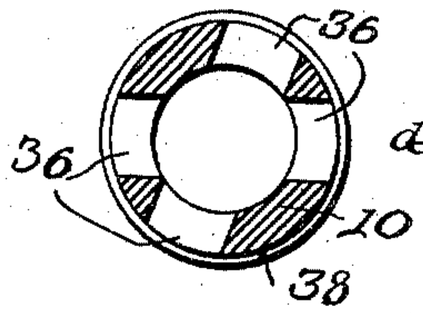


Fig. 14.

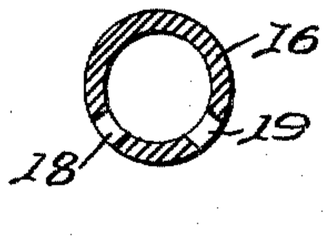
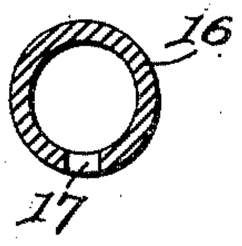


Fig. 15.



Witnesses

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UNITED STATES PATENT OFFICE.

LOUIS S. RIZER, OF SPRINGFIELD, OHIO.

OSCILLATING MOTOR.

967,560. Specification of Letters Patent. **Patented Aug. 16, 1910.**

Application filed March 26, 1908. Serial No. 423,322.

To all whom it may concern:

Be it known that I, LOUIS S. RIZER, 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 more particularly to motors of this character employing water as the motor fluid.

The object of the invention is to provide a motor of this type which will be simple in its construction and operation; which will contain a minimum number of parts, which parts will be of such a character that they will not be liable to become disarranged; and which will be provided with positively operated mechanism for controlling the flow of water to the motor, which controlling mechanism will be actuated by the movement of the piston within the motor.

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

In the accompanying drawings, Figure 1 is a vertical sectional view, taken centrally through a motor embodying my invention; Fig. 2 is a transverse sectional view, taken through the cylinder of such a motor; Fig. 3 is a side elevation of the sliding collar; Fig. 4 is a bottom plan view of the same; Fig. 5 is a side elevation of the motor shaft showing the piston in section; Fig. 6 is a transverse sectional view, taken on the line *a a* of Fig. 5 and looking in the direction of the arrows; Fig. 7 is a transverse sectional view, taken on the line *b b* of Fig. 5 and looking in the direction of the arrows; Fig. 8 is a similar view, taken on the line *c c* of Fig. 5; Fig. 9 is a similar view, taken on the line *d d* of Fig. 5; Fig. 10 is a side elevation of the inner casing of the shaft; Fig. 11 is a side elevation of the same, taken at right angles to the view in Fig. 10; Fig. 12 is a transverse sectional view, taken on the line *h h* of Fig. 10 and looking in the direction of the arrows; Fig. 13 is a similar view, taken on the line *g g* of Fig. 11 and looking in the direction of the arrows; Fig. 14 is a similar view, taken on the line *e e* of Fig. 10; and Fig. 15 is a similar view, taken on the line *f f* of Fig. 10.

In these drawings I have illustrated one embodiment of my invention and have shown the same as consisting of a motor casing 1 which, in the present instance, is in the form of a cylinder comprising upper and lower cylinder heads 2 and 3, respectively, and a cylindrical body portion 4 extending between the heads 2 and 3. These heads are preferably provided with apertured lugs 5 adapted to receive bolts 6, by means of which the cylinder is held in its assembled position. The lower cylinder head 3 is also provided with a plurality of apertured lugs 7, by means of which the motor is secured to a suitable support. Mounted in the motor casing 1 and, in the present instance, in the bearings 8 and 9 formed in the cylinder heads 2 and 3, respectively, is a hollow motor shaft 10 having secured thereto and extending radially into the chamber formed within the cylinder a blade or wing 11 forming a piston for the motor. A radial partition 42 extends inwardly from the cylindrical portion 4 of the motor casing and is provided at its inner end with a bearing 43, adapted to engage the shaft 10 and form a supporting bearing therefor, and is also provided with suitable inclined braces 44. This partition serves primarily to form an abutment to cooperate with the piston to be hereinafter described, but also serves as an additional support for the shaft 10. This shaft 10 is provided on each side of the piston 11 with one or more openings forming an inlet and an outlet for the motor fluid. In the present instance, I have shown the shaft as provided with an inlet on each side of the piston 11, as shown at 12 and 13, and with an outlet on each side of the piston, as shown at 14 and 15. Suitable means are provided for controlling the passage of water to these inlets and outlets and this controlling mechanism is of such a character that, when the inlet on one side of the piston is open, the outlet on that side of the piston will be closed and the outlet on the opposite side of the piston will be open. This controlling mechanism preferably consists of an inner casing 16 rotatably mounted within the hollow shaft 10 and provided with an opening 17 in the same radial plane with the openings 12 and 13

and so arranged as to be moved into alinement with either one of those openings. This casing is also provided with two other openings 18 and 19 located in the same radial plane with the outlets 14 and 15 and so arranged as to be moved into alinement with said openings, respectively, the openings 18 and 19 being spaced apart such a distance that, when the opening 18 is in alinement with the outlet 14, the opening 19 will be out of alinement with the outlet 15 and vice versa. This arrangement of the openings in the inner casing, relatively to the inlets and outlets in the hollow shaft, is such that it is necessary to impart but a minimum amount of movement to the inner casing to shift the relative positions of the openings, and, at the same time, the arrangement provides considerable space between the several openings, thus practically preventing all leakage between these openings.

The inner casing 16 is provided with a partition 20 located between the openings 18 and 19 and the opening 17 and dividing the inner casing into an upper portion or inlet chamber 21 and a lower portion or outlet chamber 22. Suitable means are provided for automatically actuating the inner casing 16 to shift the openings therein relatively to the inlets and outlets in the shaft 10. This controlling mechanism is preferably cam-operated and is controlled by the movement of the piston within the cylinder. The upper end of the outer casing or shaft 10, which is journaled in the bearing 8, terminates a short distance beyond the inner edge of the cylinder head 2 and is there provided with longitudinally extending lugs or projections 23, while the inner casing 16 extends a considerable distance beyond said outer casing or shaft 10. Rigidly secured to the inner casing 16 at a point adjacent to the upper end of the shaft 10 is a collar or ring 24 provided in its lower edge with recesses 25 adapted to receive the projections 23 on the end of the shaft 10. These recesses 25 are of a circumferential length greater than the width of the projections 23 and thus allow the inner casing 16 a limited rotary movement relatively to the outer casing or shaft 10, the length of this movement being such as to shift the openings of said inner casing relatively to the openings in the outer casing or shaft 10 and direct the flow of the water to the opposite side of the piston. The inner casing 16 is also provided with one or more actuating cams, which, in the present instance, are shown as consisting of substantially triangular cams 26 rigidly secured to the inner casing 16 at a point near the upper edge of the collar 24 and having their upper ends or apices rounded. Loosely mounted upon the inner casing 16 at a point beyond the collar 24 is a second collar or ring 27 provided with downwardly extending lugs or projections 28 adapted to extend between the adjacent edges of the cams 26 on the opposite sides of the inner casing 16 and preferably having their lower corners rounded, as shown. This collar is so mounted on the casing 16 as to have a free movement longitudinally thereof, but to be held against all rotary movement relatively thereto. This is preferably accomplished by providing the ring or collar on its opposite sides with projections or pins 28^a adapted to extend into longitudinal slots 29 formed in a casing 30 which incloses the outer end of the inner casing 16 and its coöperating mechanism. This casing preferably consists of a longitudinal extension of the boss which forms the bearing 8 in the cylinder head 2 and may be, if desired, formed integral with said head. The outer end of the casing 30 is, in turn, inclosed in a cap 31 which is screw-threaded to the casing 30 at a point below the inner ends of the slots 29 and is provided at its outer end with an inlet opening 32 having a nipple 33 for connecting the same with a source of water supply. The outer end of the inner casing 16 is located at a point a short distance removed from the outer end of the cap 31, thus permitting the water which enters through the inlet 32 to fill said cap and come into engagement with the outer end of the collar 27. The pressure of this water, combined with the weight of the collar itself is ordinarily sufficient to retain the collar normally in its lowermost position and to actuate the mechanism as hereinafter described. But in order to render this operation positive, I have here shown the same as provided with a spring 34 which is coiled about the outer end of the inner casing 16 between the outer end of the cap 31 and collar 27 and serves to retain the collar normally in its lowermost position with the projections 28 between the cams 26. Thus, it will be seen that as the shaft 10 rotates, the lugs 23 will be in engagement with the end walls of the recesses 25 in the collar 24 and thereby cause the inner and outer casings of the shaft to rotate in unison. As this rotation continues, the inclined face of each cam 26 will engage the edge of the adjacent projection 28 and will tend to move the collar 27 longitudinally of the inner casing 16. The continued movement of the cam relatively to the projection carries the same beyond the opposite edge of the projection 28, and, as soon as the apex of the cam has passed this edge of the projection, the pressure exerted upon the collar by the spring and the water pressure moves the collar downwardly and the engagement of the projection 28 with the cam 26 is such as to move the cam and the inner casing 16 relatively to the outer casing 10, thereby shifting the openings in said inner casing

relatively to the inlets and outlets in the outer casing and reversing the direction of movement of the piston.

The lower portion of the shaft 10 extends some distance beyond the bearing 9 in the cylinder head 3 and is adapted to be secured to suitable operating mechanism for actuating the machine which it is desired to drive. This lower portion of the shaft 10 is surrounded for some distance beyond the bearing 9 by an elongated boss or annular projection 35 forming a stuffing box. The inner casing 16 terminates a short distance beyond the inner edge of the cylinder head 3 and the hollow shaft 10 is provided near the end of this inner casing with one or more openings 36 and at a point beyond the same with a partition 36ª closing the outer end of the hollow shaft and causing the water to escape from the outlet chamber 22 of the inner casing 16 through the openings 36 to an outlet pipe 37 which is preferably formed integral with the cylinder head 3. I have here shown these outlet openings 36 as four in number and have provided the shaft 10 with an annular groove 38 extending between the openings 36 and connecting these with each other and with the outlet pipe 37. An annular cage or apertured ring 39 surrounds the shaft 10 and has its apertures arranged in alinement with the openings 36 in the shaft 10 and has its edges in engagement with the packing 40 within the stuffing box 35, the outer end of which is closed by the screw-threaded cap 41.

The operation of the device will be readily understood from the foregoing description and it will be apparent that I have provided a hydraulic motor of the oscillating type in which the flow of water to and from the motor casing is positively controlled by the movement of the piston within said casing; that the mechanism by means of which this control is accomplished is of very simple construction which is not liable to become disarranged or inoperative; that the operation of the same is positive, insuring the positive control of the controlling mechanism; and further, that the motor contains a minimum number of parts, which parts are of such a nature that the motor may be readily manufactured at a low cost and will be of a strong and durable nature.

I wish it to be understood that I do not desire to be limited to the exact 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 a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting the rotary movement of said inner casing relatively to said shaft, a cam carried by said inner casing and adapted to be moved in one direction by the rotation of said shaft, and means for actuating said cam to move said inner casing relatively to said shaft.

2. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting the movement of said inner casing relatively to said outer casing, a cam carried by said inner casing, a non-rotary member slidably mounted near said cam and adapted to be engaged thereby, and means adapted to move said slidable member to actuate said cam and the inner casing to which it is secured to shift the openings in said casing relatively to the inlets and outlets in said shaft.

3. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting the rotary movement of said inner casing relatively to said shaft, a cam carried by said inner casing, a collar slidably mounted on said inner casing beyond the end of said shaft, held against rotation thereon and having a projection adapted to engage said cam, and means for holding said projection in engagement with said cam.

4. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting

the movement of said inner casing relatively to said shaft, substantially triangular cams secured to said inner casing on the opposite sides thereof, a collar slidably mounted on said inner casing beyond said cams, held against rotation thereon and having projections located on the opposite sides of said inner casing and adapted to extend between said cams, and means for holding said projections normally in engagement with said cams.

5. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting the movement of said inner casing relatively to said shaft, substantially triangular cams secured to said inner casing on the opposite sides thereof, a slotted casing inclosing the outer end of said inner casing, a collar slidably mounted on said inner casing having projections adapted to engage the slots in said casing and longitudinal projections adapted to extend between said cams, and means for holding said longitudinal projections normally in engagement with said cams.

6. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said shaft, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting the movement of said inner casing relatively to said shaft, substantially triangular cams secured to said inner casing on the opposite sides thereof, a slotted casing inclosing the outer end of said inner casing, a collar slidably mounted on said inner casing having projections adapted to engage the slots in said casing and longitudinal projections adapted to extend between said cams, and a cap inclosing the outer end of said slotted casing and adapted to be connected to a source of water supply.

7. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, longitudinal projections carried by the outer end of said shaft, a collar rigidly secured to said inner casing having recesses adapted to receive said projections, said recesses being of greater circumferential length than the width of said projections, substantially triangular cams secured to said inner casing beyond said collar, a second collar slidably mounted on said inner casing beyond said cams, held against rotation thereon and having projections adapted to extend between said cams, and a spring adapted to hold said projections normally in engagement with said cams.

8. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means controlled by the movement of said piston for actuating said inner casing to shift said openings relatively to said inlets and said outlets, said shaft having an outlet opening therein beyond the end of said inner casing, a partition in said shaft beyond said outlet opening, a stuffing box surrounding the outer end of said shaft, and a cage within said stuffing box having an aperture in alinement with the outlet opening in said shaft, and a packing within said stuffing box on the opposite sides of said cage..

9. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled in said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having an inlet and an outlet therein on each side of said piston, the inlet and the outlet on each side of said piston being substantially in longitudinal alinement, an inner casing rotatably mounted within said hollow shaft and having an opening in the same radial plane with said inlets and adapted to be moved into alinement with either of said inlets and having two openings in the same radial plane with said outlets, each of said last-mentioned openings being adapted to be moved into alinement with one of said outlets, a partition within said inner casing between said first-mentioned opening and said last-mentioned openings, and means controlled by the movement of said piston for actuating said inner casing to shift said openings relatively to said inlets and said outlets.

10. In a motor of the character described,

a casing having a chamber within the same, a hollow shaft journaled within said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, a cam mounted on said inner casing, a collar mounted on said inner casing and having a projection adapted to engage said cam, one of said members being rigidly mounted on said casing and the other of said members being slidably mounted thereon and held against rotary movement, and means for actuating said slidable member to move said rigidly mounted member and said inner casing, to which it is secured, to shift the position of the openings in said casing relatively to the inlets and outlets in said hollow shaft.

11. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled in said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, coöperating cam devices, means for moving one of said devices longitudinally of said shaft, and means controlled by the movement thereof for actuating said inner casing to shift the openings therein relatively to the inlets and the outlets in said shaft.

12. In a motor of the character described, a casing, a hollow shaft journaled in said casing and having one end in communication with the fluid supply, a piston mounted on said shaft, said shaft having an opening on each side of said piston, a valve arranged to control the flow of the fluid through said openings, and cam devices to actuate said valve, a part of said devices being movable longitudinally to said shaft.

13. In a motor of the character described, a casing having a chamber within the same, a hollow shaft journaled in said casing, a piston carried by said shaft and adapted to move in said chamber, said shaft having inlets and outlets connecting the interior thereof with said chamber on each side of said piston, an inner casing rotatably mounted within said hollow shaft and having openings adapted to register with said inlets and said outlets, respectively, means for limiting the rotation of said inner casing relatively to said shaft, cam devices for actuating said inner casing to shift the openings therein relatively to said inlets and said outlets, a part of said devices being rigidly secured to said inner casing and a part of said devices being movable longitudinally to said inner casing and being held against rotation.

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

LOUIS S. RIZER.

Witnesses:
ELZA F. MCKEE,
EDWARD T. REED.