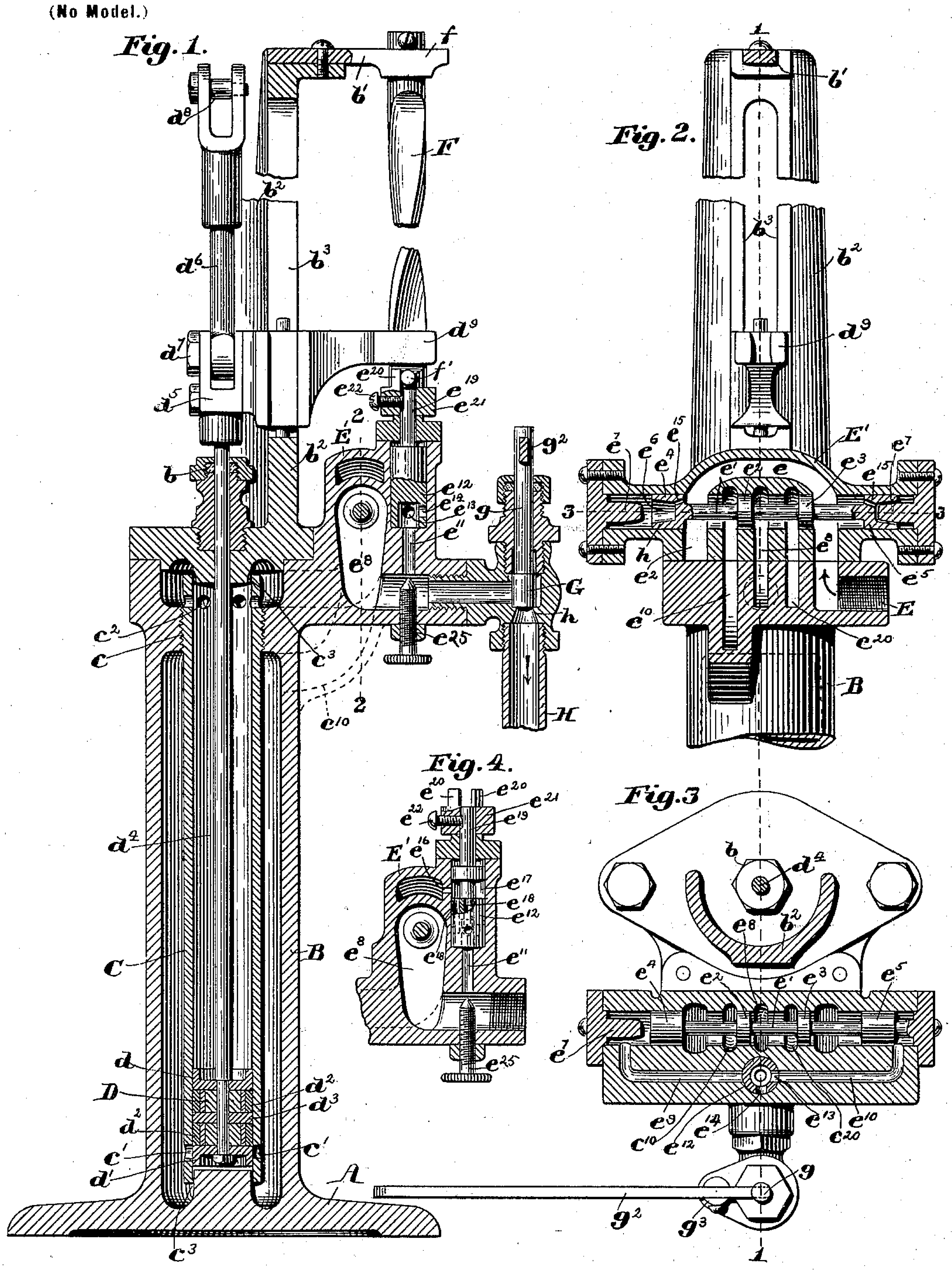
No. 609,133. Patented Aug. 16, 1898.

T. H. WYKE.

FLUID MOTOR FOR PIPE ORGANS.

(Application filed Sept. 20, 1897.)

(No Model.)



Witnesses:
Walter E. Lombard
Thomas J. Drummond

Inventor:
Thomas Hand Wyke,
by Crosby & Gregory
Attys.

UNITED STATES PATENT OFFICE.

THOMAS HAND WYKE, OF BOSTON, MASSACHUSETTS.

FLUID-MOTOR FOR PIPE-ORGANS.

SPECIFICATION forming part of Letters Patent No. 609,133, dated August 16, 1898.

Application filed September 20, 1897. Serial No. 652,259. (No model.)

To all whom it may concern:

Be it known that I, THOMAS HAND WYKE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Fluid-Motors for Pipe-Organs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is a motor particularly intended for operating the usual bellows of a pipe-organ, and having for its main object the provision of a noiseless and automatically-regulated motor, which may be attached to a usual head of water and may be readily accommodated to the particular pressure of water which the system of the city or village may supply.

A frequent disadvantage to the water-motors used in connection with pipe-organs is that they pound—that is, that the movements are such that a disagreeable pounding noise ensues—and accordingly I have devised the hereinafter-described mechanism, whereby the motor is rendered practically noiseless.

A further improvement resides in proportioning the speed or pumping results of the motor to the amount of air used and required by the organ.

I also provide means to regulate the rapidity of movement of the controlling device for the water-supply.

Various further advantages and details of improvement will be pointed out in connection with the following description of the mechanism shown in the accompanying drawings, which illustrate a further embodiment of my invention.

In the drawings, Figure 1 is a vertical sectional view taken on the line 1 1, Figs. 2 and 3. Fig. 2 is a transverse vertical section taken on the line 2 2, Fig. 1. Fig. 3 is a transverse horizontal section taken on the line 3 3, Fig. 2. Fig. 4 is a sectional detail taken substantially on the same lines as Fig. 1, showing a modification.

On a suitable base or standard A is mounted a water-column B, within which is secured, preferably to an internal annular shoulder, by a threaded joint c, a cylinder C, provided with main ports c' at one end and similar ports c^2 at its opposite end, slightly removed in both cases from the extreme ends. Within this cylinder I mount a piston D, herein shown as comprising flanged ends d d', having packing d^2 between them and the central flange or packing-ring d^3. This piston is carried by a piston-rod d^4, which passes through a usual packing-gland b at the upper end of the water-column B, where it is provided with a head d^5, to which a pitman d^6 is pivoted at d^7.

The upper end of the pitman d^6 is bifurcated in order to be pivotally bolted at d^8 to the usual pump-lever of the organ, it being understood that said lever may extend, as usual, beyond the pumping-motor, if desired, in order to be operated either by the motor or by hand, according to circumstances.

The water (and it will be understood that steam or any other fluid may be used instead of water, if desired) is admitted at an inlet E and passes in the direction of the arrow, Fig. 2, into crown e of the valve-chamber E'. In this valve-chamber I preferably mount a reciprocating slide-valve e', having usual cut-off shoulders e^2 e^3 and being provided with end closures e^4 e^5. Viewing Figs. 2 and 3, it will be observed that the latter are recessed at e^6 in order to fit over projections e^7 at either end of the valve-chamber in order to give a cushioning effect as the valve approaches the end of its reciprocating movement in either direction.

The valve described serves to open and alternately connect the ports c^{10} c^{20} with an intermediate outlet e^8, the port c^{10} connecting with the water-column, as indicated by dotted lines in Fig. 1, so as to permit the flow of water to the ports c' and the ports c^{20}, connecting with the upper ports c^2.

Viewing Figs. 1 and 3, it will be seen that I have provided passages e^9 e^{10} at one side of the valve-chamber, connecting therewith respectively at the opposite ends thereof and with a central outflow-pipe e^{11}, in which I mount a controlling-valve e^{12}, shown in Figs. 1 and 3 as provided with openings e^{13} e^{14}, adapted to open the passage e^{10} into outlet e^{11} and close the opposite passage-way e^9, or, vice versa, to close the passage e^{10} and open the passage e^9. By this provision it will be understood that by simply turning the valve or plug e^{12} in the proper direction the valve-passage behind either end of the reciprocating valve e' may be exhausted, causing the valve e' to move to that end of the chamber.

I prefer to admit water behind the valve ends e^4 e^5 by means of small ducts or perforations e^{15}, Fig. 2, although it may be admitted in any other convenient way, as by a passage e^{16}, Fig. 4, opening from the crown e of the valve-chamber into a groove or annular recess e^{17} in the adjacent part of the valve e^{12}, in which case the latter is provided with two passages e^{18} to connect the water-supply from the inlet with the passage e^9 or e^{10} when the other of said passages is connected with the outlet.

It will be evident that one opening e^{13} or e^{14} and one passage e^{18} instead of two would answer simply by giving the valve e^{12} sufficient rotation.

To rotate the valve e^{12} as required, I have shown in the present embodiment of my invention a twisted blade F, rotatably mounted at f in an arm b' of a stand b^2 and embraced by the bifurcated end d^9 of the head d^5, before mentioned, the lower end of blade F being connected to a stem e^{19} of the valve e^{12}. Viewing Figs. 1 and 4, it will be seen that the latter connection is a loose one by means of a pin f', extending through the plate F and projecting therefrom at opposite sides to engage opposite lugs e^{20} on an adjustable sleeve e^{21}, secured by a set-screw e^{22} to the stem e^{19}, the object of this provision being to cause the required rotation of the valve e^{12} just at the end of the stroke of the piston, as will be evident.

The head d^5 slides in ways b^3 in the stand b^2, being reciprocated by and with the piston-rod d^4, so that each reciprocation thereof rocks the blade F and similarly rotates the valve as required to exhaust the pressure from behind one end of the valve e' and cause it to move, thereby cutting off the flow of water from one end of the cylinder and piston and admitting it to the opposite end.

Preferably I provide the recesses e^6 and projections e^7, already mentioned, to cushion the valve e' at the end of the stroke, and, referring to Fig. 1, it will be seen that I provide also a hand-plug e^{25}, adjustable in and out, to control the outflow of the water or other fluid from the outlet e^{11}, thereby regulating the exhaust caused thereby and preventing the pressure from sliding the valve e' too fast. By this means the movements of the valve e' may be rendered as moderate as may be desired.

Another precaution and a main feature of my invention is a provision to prevent starting the strokes of the pumping-lever with too great rapidity, one means for accomplishing this being shown in Fig. 1, where it will be observed that the ends of the cylinder C are not closed, but have an opening or auxiliary port c^3, shown as annular, being formed by the space between the ends of the cylinder and bosses extending from the respective ends of the water-column, as clearly shown in Fig. 1, and that the flanged ends d d' of the piston and the ports c' c^2 are so located that the former at the beginning of each stroke cover said ports, thereby preventing the full force of the water from reaching the piston, the latter being moved at first only by the water that gets through the adjacent opening c^3. In practice this part of my invention proves of great value and advantage, inasmuch as it gives an easy movement without pounding or jerking.

G designates an automatic regulator for controlling the operation of the motor according to the amount of air being used and required by the organ, this regulator being herein shown as mounted in the main outlet H from the exhaust-outlet e^8, although I in no wise restrict myself to this location thereof. This regulator is herein shown as a cut-off or plunger g, acting to close or partially close the outlet-opening h, being freely reciprocable in a gland g' by means of a lever g^2, pivotally mounted at g^3 on said gland.

The lever g^2 is connected at its free end to the usual indicator customarily provided in pipe-organs for indicating the amount and pressure of air in the air-receiver of the organ, and which, being well known, I have omitted to illustrate, so that as the indicator rises it will operate to lower the lever g^2 and slow down the pumping movement of the motor, and if the player ceases playing it will entirely close the opening h and stop the motor.

The operation of my machine is as follows: It being understood that the pumping-lever of the pipe-organ, connected to the bellows thereof, as usual, is pivoted adjacent its free end to the pitman d^6 at d^8, the water or other fluid being used is turned on to the inlet-pipe E and flows in the direction of the arrow, Fig. 2, around the valve e', passing through the crown e around the opposite end of the valve and through the port c^{10} into the water-column B, filling the latter.

At first the water cannot have access to the cylinder C through the main ports c', but only through the more confined auxiliary inlet-openings c^3, thereby starting the piston D slowly until the latter has communicated an initial starting movement to the pumping-lever, by which time the flanged head d' has moved from in front of the ports c', so that the latter will be opened and the full force of the water-pressure is free to be exerted against the piston through the ports c', moving the piston with the desired velocity for an upstroke of the pumping-lever.

The piston, having reached the upper end, closes the ports c^2, and at the same time the upward movement through the connection of the head d^5, carried at the upper end of the piston-rod d^4 and engaging the twisted plate F, has rotated the latter, whose final movement rotates the rotary valve e^{12}, so as to open the passage e^9 to the outlet e^{11} and thereby permit the water which has been held behind the left-hand end of the valve e' to flow out, creating an exhaust at said left-hand end.

At the same time the passage e^{10} is closed by the same movement of the rotary valve e^{12} which opened the opposite passage e^9, and by the closing of this passage e^{10} the water flowing through the right-hand duct e^{15}, Fig. 2, or through the passage e^{16}, Fig. 4, as the case may be, behind the right-hand end of the valve e' is permitted to exert its pressure upon the valve e', whose opposite end has just been exhausted, and thereby readily shift the valve to the left, so as to cut off the port c^{10} and open the port c^{20}.

The water-pressure now passes through the port c^{20} against the upper end d of the piston D through the contracted opening c^3, thereby giving the initial movement of the return stroke with a gentle acceleration until the piston has moved sufficiently to uncover the ports c^2, whereupon the full pressure of the head of water is exerted and the piston is driven to the opposite end of the cylinder, completing the second stroke of the pump-lever. This second stroke brings the head d^5 down along the twisted plate F, thereby reversing it from its last position into its original position and restoring at the end of its movement the rotary valve e^{12}, so as to permit the water-pressure through the left-hand duct e^5, Fig. 2, or the passage e^{16}, Fig. 4, to be exerted at the left-hand end of the valve e', the opposite end being exhausted, as before, by the free flow of the water from behind it out of the passage e^{10} through the outlet e^{11}, thus shifting the valve e' to the right, so that the piston D will be again raised. This operation continues automatically with a rapidity depending mainly upon the freedom of outflow of the water from ahead of the moving piston, this outflow being governed by the regulator G, whose lever g^2 is connected to the pressure-indicator of the organ, so that if the pump operates with such rapidity as to raise the pressure in the organ receiving-chamber above that to which the mechanism has been adjusted the indicator will of course rise, as usual, and will thereby, by means of this feature of my invention, lower the plunger g and check the outflow of the water from the motor, thereby retarding the action of the latter, slowing down its pumping action.

On the other hand, if the piston does not move rapidly enough to maintain the normal amount of air-pressure in the receiver of the organ the indicator thereof will be below the normal and will thereby raise the plunger g of the regulator G, permitting a freer circulation of the water in the motor, so that the piston will work more rapidly and therefore pump more air into the organ.

Should the valve e' not be sufficiently cushioned by the closing down of its recess e^6 over the cone-shaped projections e^7, its sliding movement may be regulated as desired by turning up the hand-screw e^{25}, so as to check the outflow of the exhaust from in front of the reciprocating valve.

While I have herein described in detail one embodiment of my invention in order that the same may be clearly apprehended, I wish it understood that I am in no wise restricted to these details, inasmuch as various changes, substitutions, and other combinations of parts may be resorted to without departing from the spirit and scope of my invention, and also that while I have described my invention as particularly intended for and adapted to a pipe-organ it is also adapted for very many other uses, and therefore I do not restrict it to any particular use.

One extreme advantage of my invention resides in the convenience it affords for accommodating it to either high or low pressure water systems which may be found in different cities or villages.

As before explained, the cylinder C is removably secured in the water-column, (and it will be understood that the latter need not necessarily be a technical water-column, but may be any support,) so that if a high-pressure fluid source is at hand a cylinder C of small cross-sectional area will be inserted, having a correspondingly small piston, whereas if a low-pressure system is at hand a cylinder C having correspondingly greater cross-sectional area will be screwed or otherwise secured in place to accommodate a larger piston, as will be readily understood.

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

1. A fluid-motor for pumping an organ, comprising a hollow water-column or support, a cylinder detachably mounted therein, and detachable therefrom without interference with the water-column, a piston to reciprocate in said cylinder, and mechanism coöperating therewith to actuate said piston, substantially as described.

2. A fluid-motor, comprising a hollow water-column, having a central annular shoulder at its upper end, a cylinder held by and having threaded engagement with said shoulder, said cylinder extending at its upper end above said shoulder and at its lower end below the same, and being provided adjacent its ends with ports, a piston reciprocable in said cylinder, and mechanism to operate said piston, substantially as described.

3. A fluid-motor, comprising a hollow water-column, having a central annular shoulder at its upper end, a cylinder held by and having threaded engagement with said shoulder, said cylinder extending at its upper end above said shoulder and at its lower end below the same, and being provided adjacent its ends with ports, the ends of said cylinder being open, and the adjacent ends of the water-column having projecting bosses overlapping said open ends with an annular space therebetween constituting auxiliary ports, for the purpose specified, a piston reciprocable in said cylinder, and mechanism to operate said piston, substantially as described.

4. A fluid-motor, comprising a water-column, having an internal annular shoulder adjacent one end, a cylinder mounted therein and extending at the opposite sides of said shoulder, said cylinder being provided with ports at its opposite ends, independent chambers in said water-column separated by said internal shoulder, a stand b^2 mounted at one end of said water-column, a piston and piston-rod for said cylinder, a head carried by said rod and reciprocable in ways provided therefor in said stand, said head having a bifurcated end, a twisted blade rotatably mounted parallel to said ways and embraced on its opposite sides by said bifurcated end, a valve loosely connected to said blade to be intermittingly rocked thereby, a slide-valve, a valve-chamber therefor, said slide-valve being provided intermediate its ends with cut-off shoulders and at its ends with cushioning devices, end recesses in said chamber receiving said cushioning ends of the valve, passages from said end recesses to said rock-valve adapted to be controlled thereby, a central outlet from said chamber, a passage connecting therewith from the rock-valve, and passages from said valve-chamber to the water-column, substantially as described.

5. A fluid-motor, comprising a water-column, having an internal annular shoulder adjacent one end, a cylinder mounted therein and extending at the opposite sides of said shoulder, said cylinder being provided with ports at its opposite ends, independent chambers in said water-column separated by said internal shoulder, a stand b^2 mounted at one end of said water-column, a piston and piston-rod for said cylinder, a head carried by said rod and reciprocable in ways provided therefor in said stand, said head having a bifurcated end, a twisted blade rotatably mounted parallel to said ways and embraced on its opposite sides by said bifurcated end, a valve loosely connected to said blade to be intermittingly rocked thereby, a slide-valve, a valve-chamber therefor, said slide-valve being provided intermediate its ends with cut-off shoulders and at its ends with cushioning devices, end recesses in said chamber receiving said cushioning ends of the valve, passages from said end recesses to said rock-valve adapted to be controlled thereby, a central outlet for said chamber, a passage connecting therewith from the rock-valve, passages from said valve-chamber to the water-column, a plunger controlling the outflow from said outlet, and means automatically operating said plunger, substantially as described.

6. A fluid-motor, comprising a water-column, having an internal annular shoulder adjacent one end, a cylinder mounted therein and extending at the opposite sides of said shoulder, said cylinder being provided with ports at its opposite ends, independent chambers in said water-column separated by said internal shoulder, a stand b^2 mounted at one end of said water-column, a piston and piston-rod for said cylinder, a head carried by said rod and reciprocable in ways provided therefor in said stand, said head having a bifurcated end, a twisted blade rotatably mounted parallel to said ways and embraced on its opposite sides by said bifurcated end, a valve loosely connected to said blade to be intermittingly rocked thereby, a slide-valve, a valve-chamber therefor, said slide-valve being provided intermediate its ends with cut-off shoulders and at its ends with cushioning devices, end recesses in said chamber receiving said cushioning ends of the valve, passages from said end recesses to said rock-valve adapted to be controlled thereby, a central outlet from said chamber, a passage connecting therewith from the rock-valve, passages from said valve-chamber to the water-column, a plunger controlling the outflow from said outlet, means automatically operating said plunger, and a hand-plug between said plunger and the slide-valve for regulating the outflow from the rock-valve to said outlet, substantially as described.

7. In a fluid-motor, the herein-described loose connection for intermittingly operating the controlling-valve, in combination with said controlling-valve, a slide-valve, ports from the latter, and passages between said valves, said loose connection comprising a twisted blade extending in alinement with the rotary valve, the latter having opposite lugs projecting therefrom, and the twisted blade having a pin extending transversely across its end between said lugs, the space between said lugs being greater than the width of said pin, a bifurcated head in sliding engagement with said blade, and means for reciprocating said head, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS HAND WYKE.

Witnesses:

GEO. H. MAXWELL,
JOHN C. EDWARDS.