No. 807,448. PATENTED DEC. 19, 1905.

H. T. FARNSWORTH.

FLUID MOTIVE POWER PUMP.

APPLICATION FILED NOV. 12, 1904.

2 SHEETS—SHEET 1.

Fig. 4.

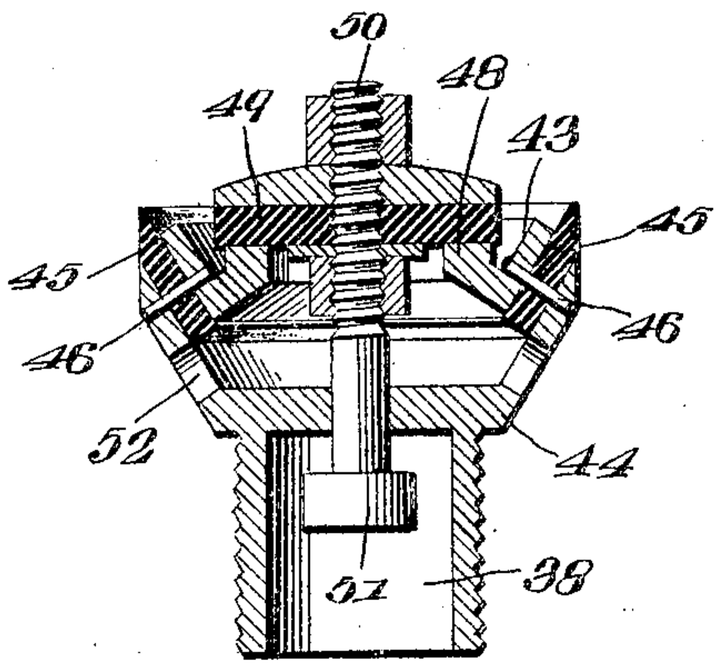
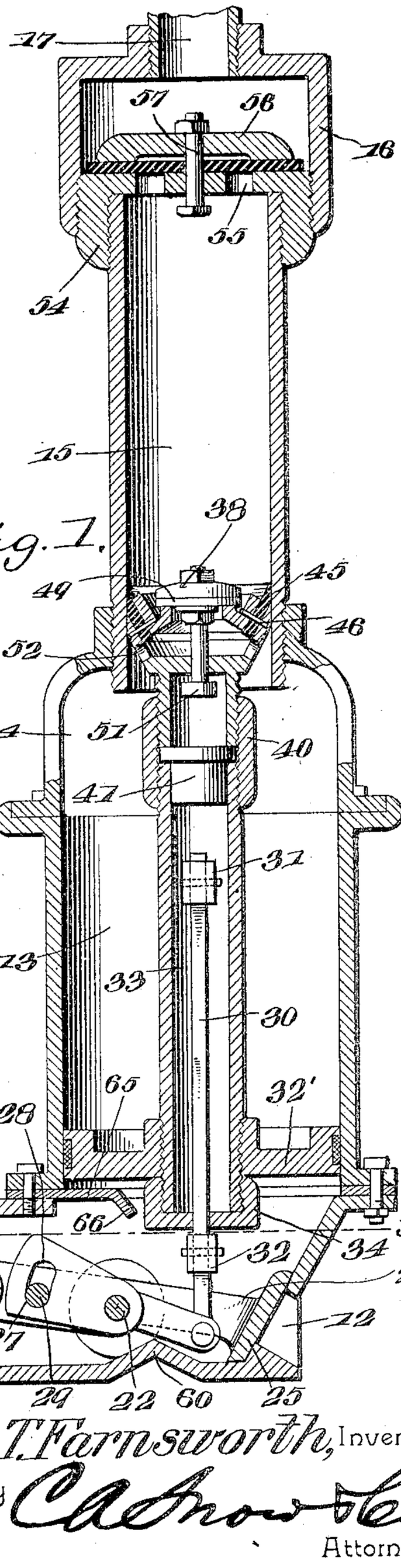


Fig. 1.



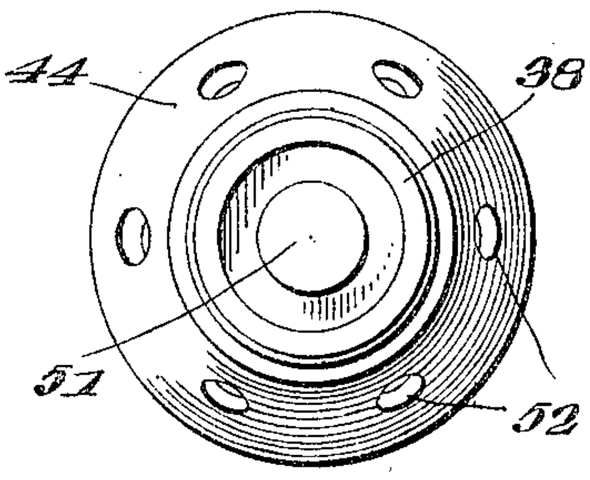


Fig. 5.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

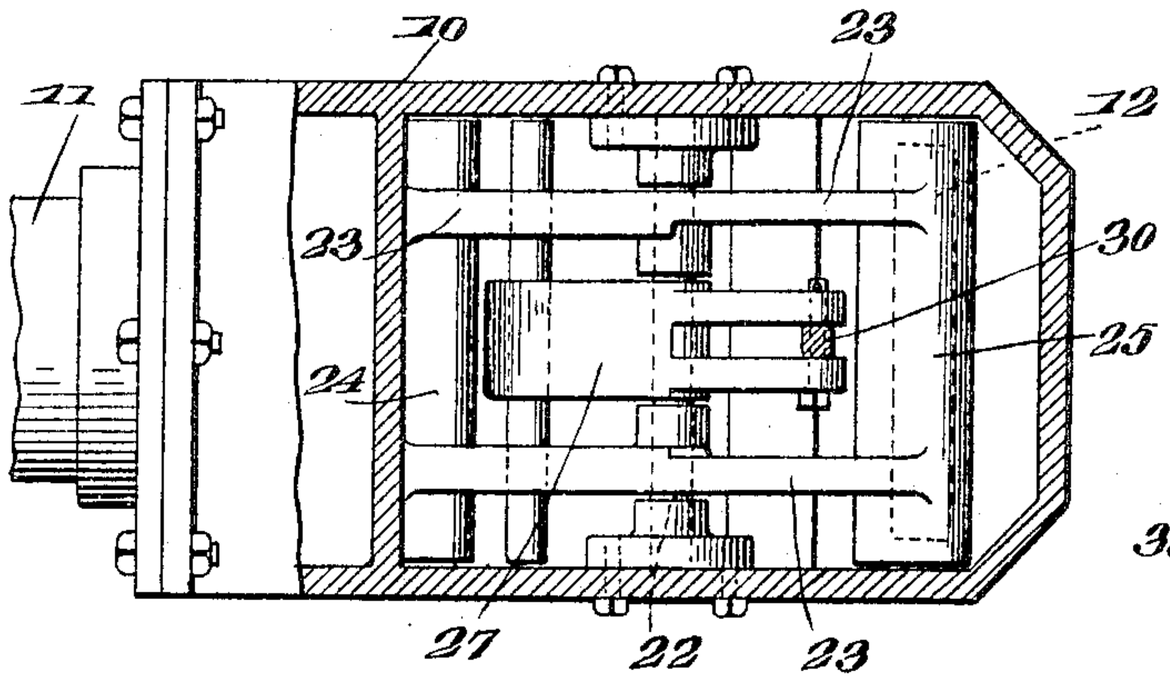

Fig. 6.

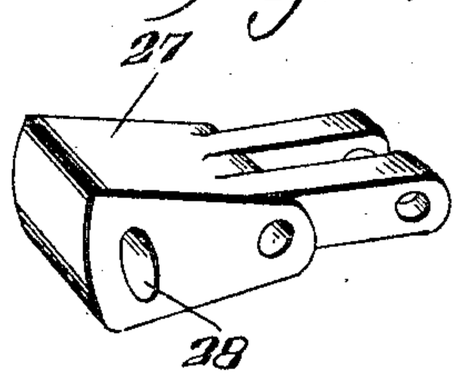

Fig. 2.

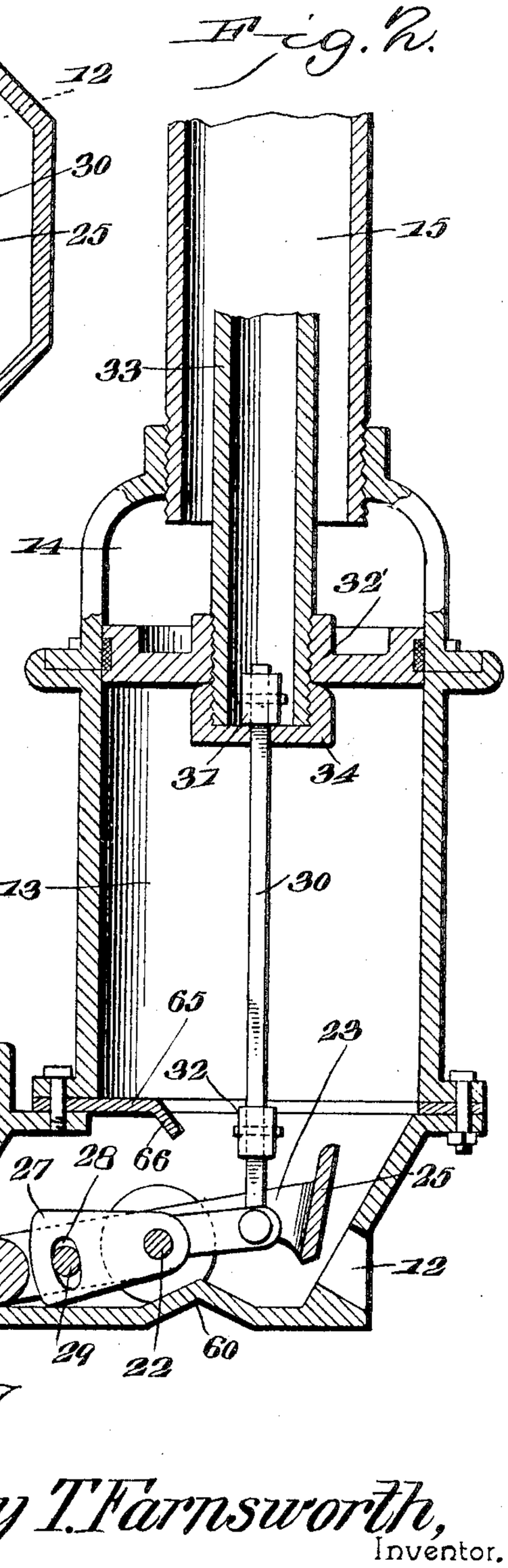

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

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FLUID-MOTIVE POWER-PUMP.

No. 807,448. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed November 12, 1904. Serial No. 232,512.

To all whom it may concern:

Be it known that I, HENRY T. FARNSWORTH, a citizen of the United States, residing at Glade Spring, in the county of Washington and State of Virginia, have invented a new and useful Fluid-Motive Power-Pump, of which the following is a specification.

The principal object of the present invention is to provide a pump in which the pressure or head of a body of water may be employed for the pumping of another body of water or air or other fluids.

A further object of the invention is to provide a novel form of pump in which the pumping action will be regular and will not fluctuate to any appreciable extent when the volume of water is altered.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of a pump constructed in accordance with the invention. Fig. 2 is a similar view of a portion of the same, showing the piston elevated and the discharge-valve open. Fig. 3 is a sectional plan view of the pump on the line 3 3 of Fig. 1. Fig. 4 is a detail sectional view, on an enlarged scale, of the air-pumping piston. Fig. 5 is an inverted plan view of the same. Fig. 6 is a detail perspective view of the valve-actuating weight detached. Fig. 7 is a plan view of the division-plate, which may be placed at the lower end of the cylinder.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The base 10 of the machine is provided with a water-inlet pipe 11, through which water may be admitted from any source of supply, and a water-discharge port 12, through which the water escapes after each reciprocation of the piston. To the base is secured a power-cylinder 13, the upper end of which is open, and to the cylinder is secured a cross bar or yoke 14, carrying an upper cylinder 15, that preferably is of smaller diameter than the power-cylinder 13, the lower end of said cylinder 15 being open for the admission of air. To the upper end of the cylinder 15 is secured a casing 16, from which leads a pipe 17, that is connected to a reservoir where the air is to be stored or to any point where the air-pressure is to be utilized.

The base or water-chamber 10 is approximately of rectangular form and is provided with an inlet-port 20, through which the water enters to operate the pump, the water-inlet being at one side of the chamber and the outlet 12 at the opposite side thereof. Extending transversely across the chamber is a horizontally-disposed pivot-bar 22, on which is mounted a pair of valve-carrying levers 23, the heavier ends of which are at the inlet side of the casing. Secured to the heavier ends of the bars is a valve 24 for controlling the entrance of water through the port 20, and at the opposite ends of said levers is secured an outlet-valve 25 of much lighter weight, so that if left free the valve 24 will close by gravity. The front wall of the inlet-chamber, in which the port 20 is formed, is arranged on a curved line struck from the center of the pivot-bar, and the face of the valve is likewise curved. The rear wall, in which the outlet-port 12 is formed, is disposed at an angle oblique to the base, and the outlet-valve 25 is correspondingly arranged, so that it will be held closed by the weight and current force of the water running into the chamber. Pivotally mounted on the bar 22 is a weighted arm 27, the weighted end being disposed toward the inlet side of the chamber, and in the weight is formed an elongated slot 28, the side walls of which are arranged on arcuate lines struck from the center of the pivot-bar. Through this slot extends a small pin or cross-bar 29, that is rigidly secured to the two weighted levers 23, the slot permitting the independent movement to a limited extent of the weight and the valves. The weighted lever 27 is connected at its rear end to a vertically-disposed rod 30, on which are secured two collars 31 and 32, for a purpose hereinafter described.

The power-cylinder 13 receives a piston 32', provided with suitable packing and carrying a hollow piston-rod 33, that extends through the piston and is provided at its lower end with a cap 34, having an opening for the pas-

sage of the rod 30. This piston is raised from the position shown in Fig. 1 to the position shown in Fig. 2 by the volume of water entering through the port 20, and as soon as it reaches the position shown in Fig. 2 the cap 34 will come into contact with the collar 31 and will raise the rod 30 and act through the weighted lever to close the inlet-port and open the outlet-port to permit the escape of water from the cylinder. To the upper end of the piston-rod is secured a piston 38, that fits within the air-pumping cylinder 15, and in order to prevent the entrance of water to said cylinder the hollow piston-rod 33 is made in two sections coupled by a sleeve 40, and a closing-plug 41 is placed between the two sections to prevent the passage of water to the upper end of the rod.

The piston 38 is formed of an upper ring 43 and a lower ring 44, the latter being preferably extended to form the upper section of the piston-rod. The rings 43 and 44 have flaring flanges that are arranged parallel with each other, and between them is placed a ring 45, formed of leather or other suitable packing material, the packing being confined in place by pins or bolts 46. This packing is so arranged that it presents a comparatively thin edge to the surface of the air-cylinder and will be held tightly in place by the compressed air, so that leakage will be reduced to a minimum. The upper ring 43 is faced to form a valve-seat 48, on which rests a valve 49, the various members of the valve being rigidly secured together by a bolt 50, that extends through a suitable guiding-opening in the lower ring and is provided with an enlarged head 51, which limits opening movement of said valve. The periphery of the lower ring 44 is provided with a number of air-let openings 52, through which air passes on the downstroke of the piston and opens the valve 49, the air thence passing into the upper portion of the air-pumping cylinder 15.

At the top of the cylinder 15 is a flanged cap 54, the top of which is faced to form a valve-seat, and in the cap are formed openings 55, through which the air may escape from the cylinder on the upstroke of the piston. On the valve-seat rests a valve 56, that is guided by a bolt 57, extending through a suitable opening in the center of the cap, the lower end of said bolt being provided with an enlarged head to limit opening movement of said valve. The flange of the cap 54 is provided with internal threads for the reception of the threaded upper end of the cylinder 15, and the outer face of the flange is provided with threads for the reception of internal threads formed on the valve-casing 16.

In the operation of the device, the parts being in the position shown in Fig. 1, the volume of water entering through the port 20 will be deflected by the inclined bottom portion 60 of said casing into contact with the piston, so that the force of the entering stream of water will be utilized to the best advantage. Owing to the inclined position of the outlet-valve when closed, the weight and force of the current of water entering the casing will maintain said valve in its closed position until the piston nears the limit of its upward movement. The water acting on the piston 32′ forces the latter upward to the position shown in Fig. 2, and during this upward movement the air in the upper portion of the cylinder 15 is forced outward through the openings 55 to the discharge-pipe 17. When the piston nears the limit of its upward movement, the cap 34 engages the collar 31 and raises the rod 30. This moves the weighted end of the lever 27 downward, and the upper end of the slot 28 engages the bar 29 and displaces the valve. As the inlet-valve is heavier than the discharge-valve, the parts will move to the position shown in Fig. 2, closing the inlet-port and opening the outlet-port 12 to permit the discharge of water from the chamber and cylinder by gravity. As the water flows out the piston 32′ descends, carrying with it the piston 38, and as the latter moves down air will pass through the ports 52 and will open the valve 49 and flow into the upper portion of the air-cylinder 15. When the piston 32 nears the limit of its downward movement, the cap 34 will engage the lower collar 32 and the weighted end of the lever 27 will be raised until the lower portion of the slot 28 engages the cross-bar 29 and moves the valves to the position shown in Fig. 1, thus closing the outlet and again permitting water to flow through the inlet-port 20.

It will be observed that by inclining the bottom, as indicated at 60, the volume of inflowing water will be directed into contact with the piston, and at the same time the weight of the water will be imposed on the inclined face of the discharge-valve and retain the latter in closed position.

By the employment of the weighted lever 27 it is found that the operation of the pump is uniform and will not vary or become irregular with change in the head of water operating the pumping-piston.

It is obvious that in lieu of pumping air into the cylinder 15 water or other fluid may be pumped and the device used for the pumping of pure water from a limited source of supply by means of a larger volume of pure or comparatively impure water, such conditions being found where a spring is located adjacent to a running stream.

In some cases where there is a heavy head of water the piston will not at all times descend. To provide for this a division-plate 65 is introduced between the lower end of the cylinder 13 and the base 10. The division-plate is provided with an opening, one wall of which is bent downward to form an inclined flange or apron 66, that will to some extent prevent

the current of water acting directly on the piston. This is used, however, only where the water is under high pressure.

Having thus described the invention, what is claimed is—

1. The combination with a casing, of a pivot-rod, a pair of valve-carrying levers mounted thereon, inlet and discharge valves carried by said levers, a cross-bar connecting the levers, a weighted lever mounted on the pivot-rod and provided with a slot for the passage of the cross-bar, a cylinder in communication with the casing, a piston disposed in said cylinder and exposed to water-pressure, and means for transmitting movement from the piston to the weighted lever.

2. The combination with a casing having inlet and discharge ports, of a pair of connected valves for successively opening and closing said ports, said valves being pivotally mounted, and the inlet-valve being movable to closed position by gravity, a counterweighted lever for moving said valves, the lever having limited play independent of said valves, a cylinder, a piston disposed therein, and means for connecting said piston to the weighted lever.

3. The combination with a casing having inlet and discharge ports, of a pair of superposed cylinders, pistons arranged in said cylinders, a hollow stem or rod connecting such pistons, a cap member at the lower end of said stem or rod, a valve-operating rod extending through the cap to the interior of the stem and provided with collars near its upper and lower ends to be engaged by said cap, pivotally-mounted valves in the casing, a counterweighted lever for transmitting movement to said valves, and means for connecting the lever to the valve-operating rod.

4. The combination with a casing having inlet and discharge ports, controlling-valves therefor, a pair of superposed cylinders, of which the lowest is in communication with the casing, pistons arranged in said cylinders, a hollow stem connecting said pistons, a closing-plug arranged in the stem, and a valve-operating rod extending through said stem and serving to transmit movement to the valves.

5. In a device of the class specified, the combination with a casing having inlet and discharge ports, of valves for controlling the flow of fluid through said ports, a cylinder in communication with the casing, a division plate or ring between the casing and cylinder and provided with a pendent flange or deflecting-apron facing the inlet-port, and a pumping-piston in said cylinder.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HENRY T. FARNSWORTH.

Witnesses:
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GEO. A. C. BEATTIE.