

No. 896,327.

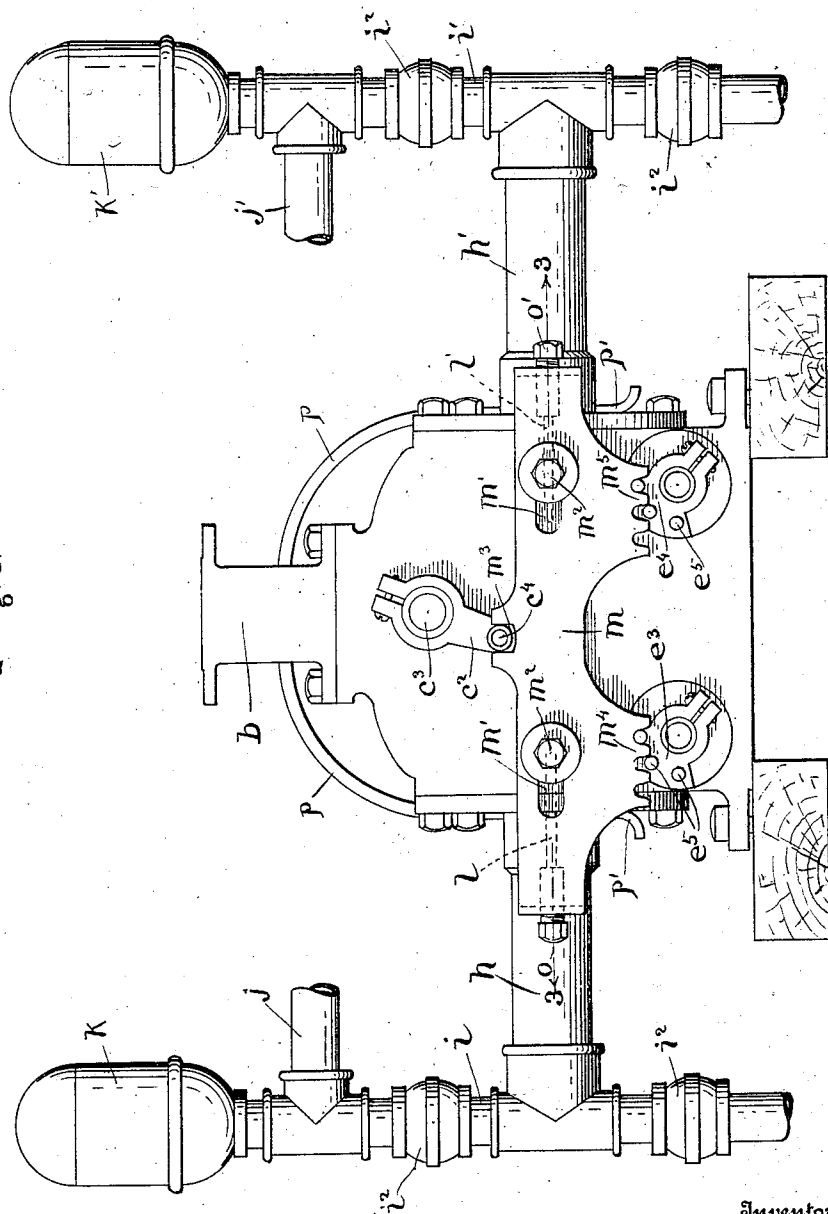
PATENTED AUG. 18, 1908.

E. C. ROBERTS.
HYDRAULIC ENGINE AND PUMP.

APPLICATION FILED DEC. 28, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor

Edward C. Roberts

Witnesses

Stuart Hilcher.
George M. Anderson.

By

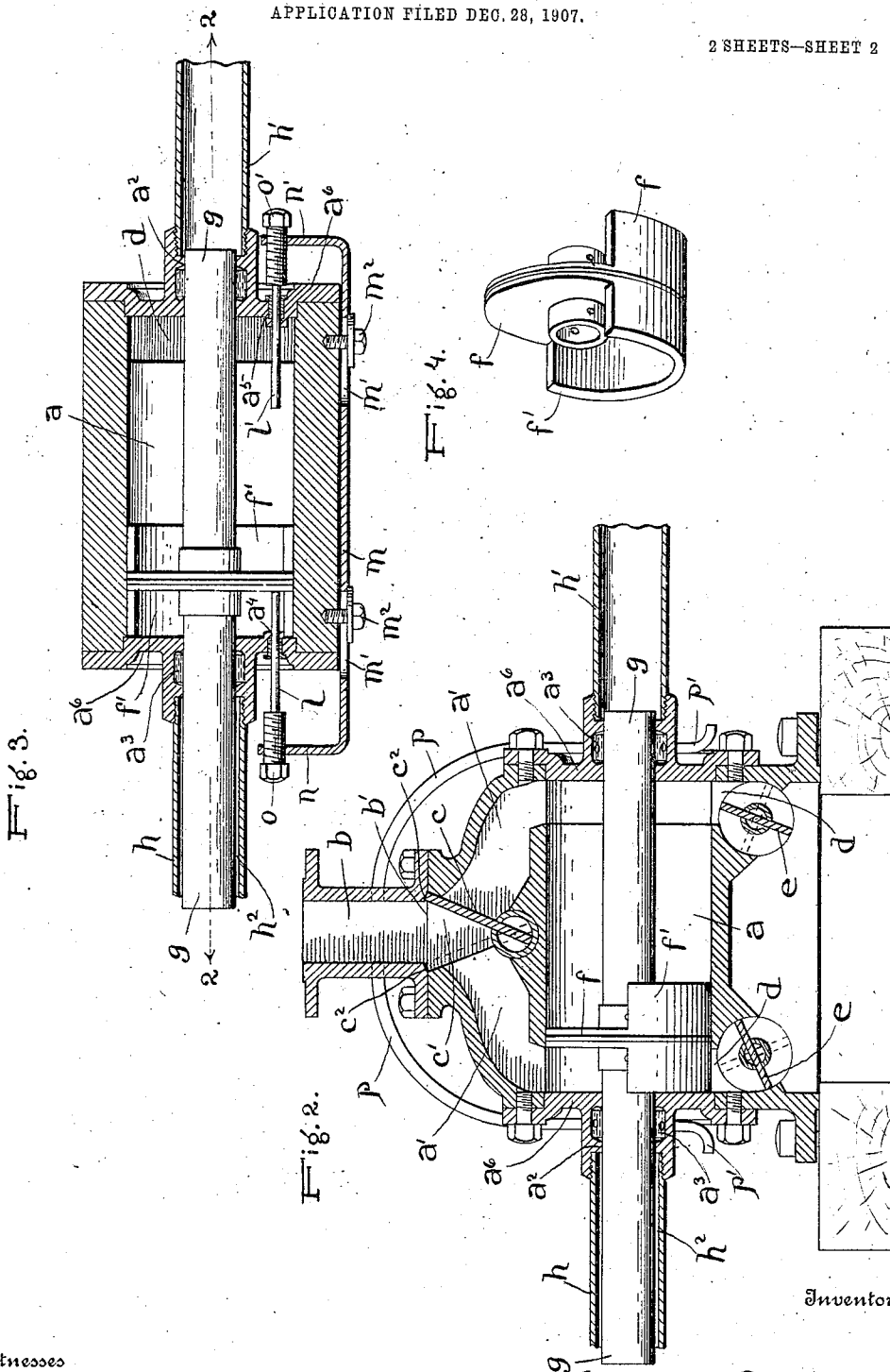
C. W. Anderson

his Attorney

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Witnesses

Stuart Hilder.
George M. Anderson.

By

Edward C. Roberts

C. W. Anderson
his Attorney

Inventor

UNITED STATES PATENT OFFICE.

EDWARD C. ROBERTS, OF SALTVILLE, VIRGINIA.

HYDRAULIC ENGINE AND PUMP.

No. 896,327.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed December 28, 1907. Serial No. 408,411.

To all whom it may concern:

Be it known that I, EDWARD C. ROBERTS, a citizen of the United States, resident of Saltville, in the county of Smyth and State of Virginia, have made a certain new and useful Improvement in Hydraulic Engines and Pumps; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of the invention, as applied. Fig. 2 is a section on the line 2—2, Fig. 3, the reversed positions of the valves being shown in dotted lines. Fig. 3 is a section on the line 3—3, Fig. 1, with the valves in reversed positions. Fig. 4 is a detail view of the piston.

The invention relates to hydraulic engines and pumps, having for its object the provision of improved means for supplying water to country and suburban residences and buildings, where there is plenty of contaminated water suitable for power purposes and springs of fresh clean water near by but not having sufficient flow or fall for use as power. Other objects and advantages will hereinafter appear.

The invention consists in the novel construction and combinations of parts as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the letter *a*, designates the main cylinder, having in its top wall converging intersecting passages *a'*, *a'*, establishing communication between opposite ends of said cylinder, and a vertical pipe *b*, having inlet opening *b'*, said pipe *b*, having suitable connection with the power supply, which should be a stream of water having a fall of three feet or more and which may be contaminated with dirt or otherwise. The entrance of water to the passages *a'*, *a'*, is controlled by inlet valve *c*, of plate character, pivoted at its lower edge centrally of the top of the cylinder, having contact at its parallel sides with the corresponding sides of the valve chamber *c'*, and engaging at its upper edge valve seats *c²*, *c²*, at opposite sides of the valve chamber. Discharge openings *d*, *d*, are provided in the bottom of the cylinder at opposite ends thereof, controlling valves *e*, *e*, being provided therefor, said valves having

plate flanges extending upon opposite sides of a central pivot.

Working in the cylinder *a*, is the piston *f*, which is located centrally of a plunger rod *g*, preferably of tubular character and having closed ends, said piston having opposite lower semi-cylindrical flange extensions *f'*, one of which at the end of each stroke overlies the discharge opening and the valve controlling the same at the corresponding end of the cylinder.

The plunger *g*, has sliding bearings in the cylinder heads *a²*, suitable packing being provided at *a²*, and works in oppositely extending pump cylinders *h*, *h'*, in line with the main cylinder *a*, and having connection at their outer ends with the vertical piping or pump bodies *i*, *i'*, in the same plane thereas and provided with check valves *i²*, *i²*, above and below the pump cylinders aforesaid. The piping or pump bodies *i*, *i'*, have suitable connection at the lower end with a source of pure water, which may be a spring having no great flow or fall, and the upper end portions thereof are provided with discharge branches *j*, *j'*, leading to the point whence the water is to be carried, air domes *k*, *k'*, being located above such branches for the purpose of regulating the flow. Horizontal pins *l*, *l'*, have slidable engagement with perforations *a³*, of the cylinder heads *a²*, suitable packing being provided at *a³*, and said pins being arranged to be moved outward by contact with the piston *f*, at the ends of the strokes thereof.

For the purpose of automatically working the several valves through the action of the pump a horizontally working slide *m*, is provided at one side of the machine, said slide having horizontal slots *m'*, at opposite end portions thereof engaged by supporting pins or bolts *m²*, having movement in such slots; and beyond said slots having turned extremities *n*, and *n'*, carrying adjusting screws *o*, and *o'*, which engage the pins *l*, and *l'*; the valves *c*, and *e*, *e*, being operated by said slide in the manner now to be described. Clamped upon the pivot tube or pin *c³*, of the valve *c*, is a downward extending crank arm *c⁴*, having the same inclination as the valve itself, said crank arm having at its lower end an anti-friction roller *c⁴*, having engagement with a notch *m³*, in the upper edge of the slide at the central portion thereof. Clamped upon the pivot tubes or pins of the valves *e*, *e*, are upward extending crank arms *e³*, and *e⁴*,

having the same inclination as said valves and provided each with three pins or outward projecting teeth e^b , having engagement with the teeth of short racks m^4 , m^5 , formed in the lower edge of the rack m , at opposite end portions thereof. The valve c , has an inclination of $27\frac{1}{2}$ degrees to the vertical, and in its action swings to vertical position and takes a similar inclination at the opposite side, thus swinging through an arc of 45 degrees; this action being repeated so long as the machine is in operation. The valves e , e , have each a similar inclination to the vertical when in open position but are located respectively upon opposite sides of the vertical, and in closed position are turned one quarter around through an arc of ninety degrees, one of the valves being open when the other is closed.

In the operation of the device, the parts being suitably connected with the power supply and source of suction, water is admitted to the inlet opening b' , and through one of the converging passages a' , to the cylinder a , at one side of the piston f , whereby such piston is moved to the opposite end of the cylinder, at the same time through the medium of the valve operating slide m , and pin l or l' reversing the positions of the various valves c , and e , e , to discharge the water previously admitted and turn the course of the entering water to the opposite end of the cylinder and opposite side of the piston. In order to reduce friction to a minimum the plunger rod g , has its packing boxes in the cylinder heads supplied with water by means of small curved pipes p , p , having connection at their upper ends with vertical pipe b , drain pipes p' , p' , being provided for such boxes. For a similar reason the plunger rod has a loose fit in the pump cylinders h , h' , there being a narrow annular space h'' , left between the plunger rod and cylinders. The valve c , when moved to change the course of the current of water from one end of the cylinder to the other is at the start inclined to the current of water at an angle of $27\frac{1}{2}$ degrees—is first moved to parallel position with or edgewise to the current, and having been moved slightly past the vertical the force of the current itself in changing its course will complete the valve movement. The valve thus exerts a minimum amount of resistance against the entering current of water.

Having described the invention, what I claim and desire to secure by Letters Patent is:

1. A hydraulic engine and pump, having in combination a main cylinder provided with a water inlet, intersecting passages establishing communication between said inlet and the ends of the cylinder, a valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other,

discharge openings at opposite ends of the cylinder, valve means controlling the same, pumping means having cylinders in line with the main cylinder, a piston in said main cylinder having a plunger at each side thereof working in the pump cylinders, and means for reversing the valves including slidable pins having bearings in the cylinder heads and adapted to be moved by the piston at the ends of the strokes thereof, and a reciprocatory slide engaging said pins and having operating connection with the valve and valve means.

2. A hydraulic engine and pump, having in combination a main cylinder provided with a water inlet, intersecting passages establishing communication between said inlet and the ends of the cylinder, a valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other, discharge openings at opposite ends of the cylinder, valve means controlling the same, pumping means having cylinders in line with the main cylinder, a piston in said main cylinder having a plunger at each side thereof working in the pump cylinders, and means for reversing said valves including slidable pins having bearings in the cylinder heads and capable of being moved by said piston at the ends of the strokes thereof, and a reciprocatory slide having intumed ends carrying set screws engaging said pins and having operating connection with the valve and valve means.

3. A hydraulic engine and pump, having in combination a main cylinder provided with a water inlet, intersecting passages establishing communication between said inlet and the ends of the cylinder, a pivoted valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other, said valve having a crank arm upon its pivot, discharge openings at opposite ends of the cylinder, pivoted valves controlling the same and having crank arms upon their pivots, pumps having cylinders in line with the main cylinder, a piston in said main cylinder having a plunger at each side thereof working in the pump cylinders, and means for reversing the valves including slidable pins having bearings in the cylinder heads and capable of being moved by the piston at the ends of the strokes thereof, and a reciprocatory slide having operative connection with the crank arms of the valves and having intumed ends carrying set screws engaging said pins.

4. In a hydraulic engine and pump, the combination of a main cylinder provided with a water inlet, intersecting passages establishing communication between said inlet and the ends of the cylinder, a valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other,

ble of changing the course of the water from one end of the cylinder to the other, discharge openings at opposite ends of the cylinder, valves controlling the same, pumps having cylinders in line with the main cylinder, a piston in said main cylinder having opposite part cylindrical extensions overlying said discharge openings and the valves thereof at the ends of the strokes, said piston having a plunger at each side thereof working in the pump cylinders, and means for reversing the valves at the ends of the strokes of the piston.

5. In a hydraulic engine and pump, the combination of a main cylinder provided with a water inlet, intersecting passages establishing communication between said inlet and the ends of the cylinder, a valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other, discharge openings at opposite ends of the cylinder, valves controlling the same, pumps having cylinders in line with the main cylinder, said main cylinder having central openings in the heads thereof, a piston in said main cylinder having opposite part cylindrical extensions overlying said discharge openings and the valves thereof at the ends of its strokes, said piston having a plunger rod at each side engaging the openings in the cylinder heads and having loose engagement with the pump cylinders, water packing for said openings, and means for reversing the valves at the ends of the piston strokes.

6. In a hydraulic engine and pump, the combination of a main cylinder provided with a water inlet and a pipe above the same, intersecting passages establishing communication between said inlet and the ends of the cylinder, a valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other, discharge openings at opposite ends of the cylinder, valves controlling the same, pumps having cylinders in line with the main cylinder, said main cylinder

der having central openings in the heads thereof, a piston in said main cylinder having opposite part cylindrical extensions overlying said discharge openings and the valves thereof at the ends of its strokes, said piston having a plunger rod at each side of less diameter than the pump cylinder interiors, engaging the openings in the cylinder heads, and working in the pump cylinders, water packing for said openings having supply connection with the pipe above the water inlet, and means for reversing the valves at the ends of the piston strokes.

7. In a hydraulic engine and pump, the combination of a main cylinder provided with a water inlet, intersecting passages establishing communication between said inlet and the ends of the cylinder, a pivoted valve located at the intersection of said passages and capable of changing the course of the water from one end of the cylinder to the other, said valve having a crank arm upon its pivot, discharge openings at opposite ends of the cylinder, pivoted valves controlling said openings and having crank arms upon their pivots, pumps having cylinders in line with the main cylinder, a piston in said main cylinder having opposite part cylindrical extensions overlying said discharge openings and the valves thereof at the ends of the piston strokes, said piston having a plunger rod at each side of less diameter than the interiors of the pump cylinders and working therein, and means for reversing the valves including slidable pins having bearings in the cylinder heads and engaging the piston at the ends of the strokes thereof, and a reciprocatory slide having operative connection with the crank arms of the valves and having inturned ends carrying set screws engaging said pins.

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

EDWARD C. ROBERTS.

Witnesses:

J. A. BLACKWELL,
J. L. MULLINS.