(No Model.) 2 Sheets—Sheet 1.

H. F. SCHROEDER.

HYDRAULIC PUMP.

No. 602,666. Patented Apr. 19, 1898.

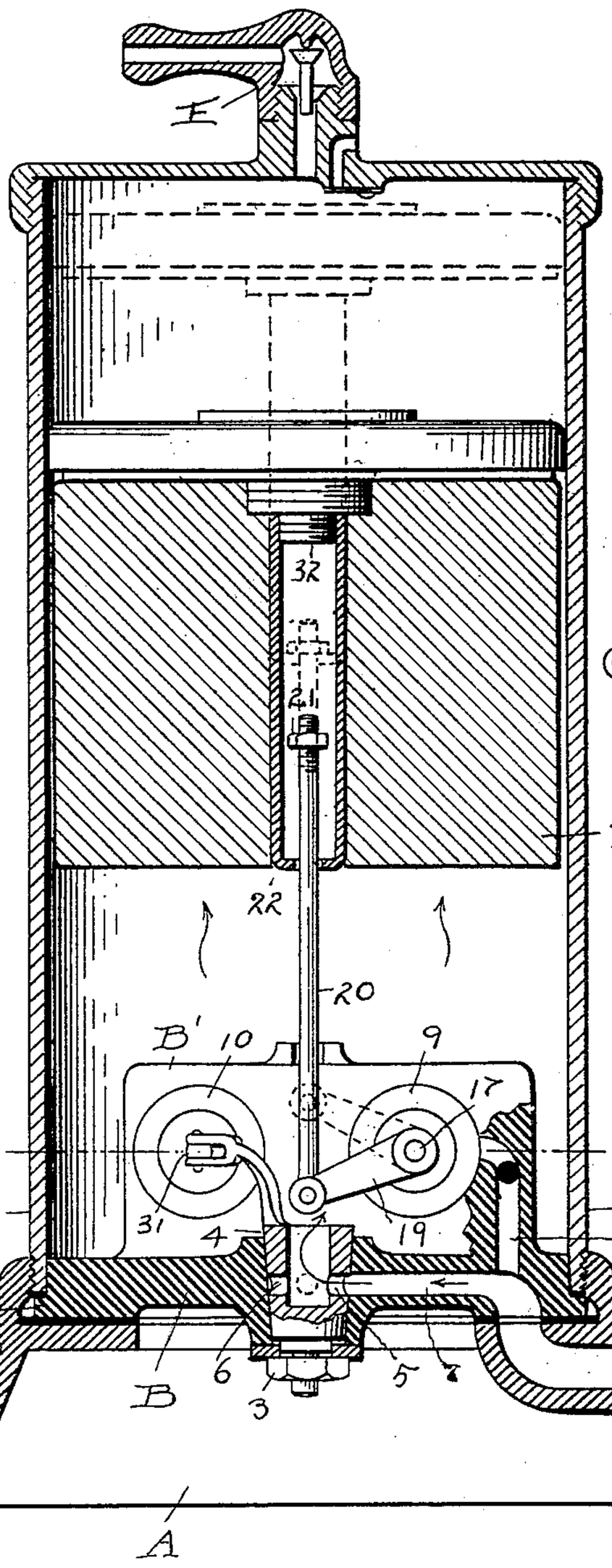
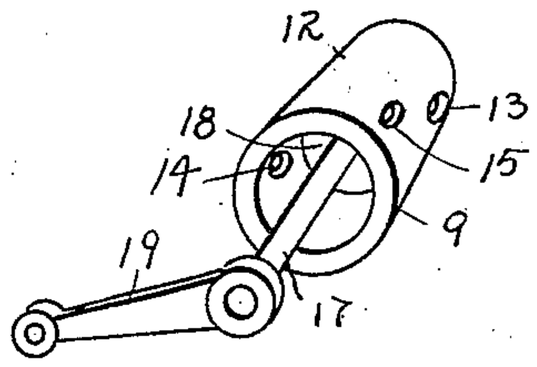


Fig. 1.

Fig. 5.



ATTEST

R. B. Moser

H. E. Wedderburn

INVENTOR.

Henry F. Schroeder

BY H. J. Fisher ATTY

(No Model.) 2 Sheets—Sheet 2.

H. F. SCHROEDER.

HYDRAULIC PUMP.

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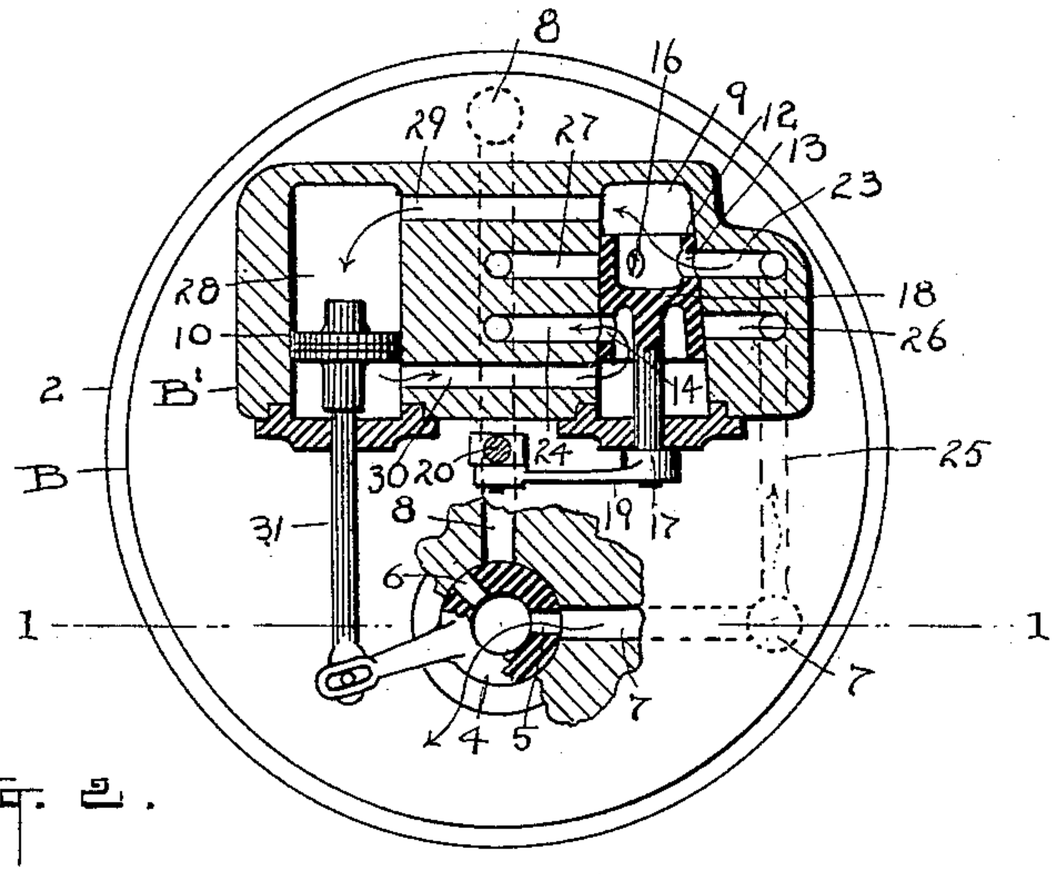

FIG. 2.

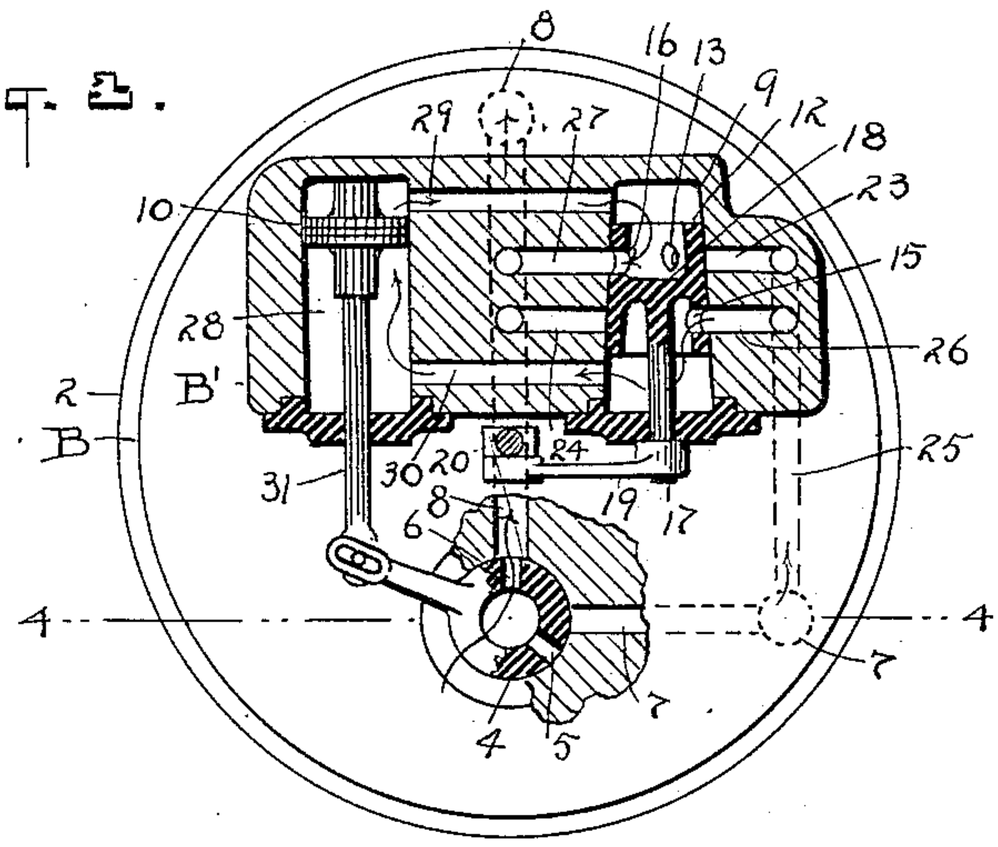

FIG. 3.

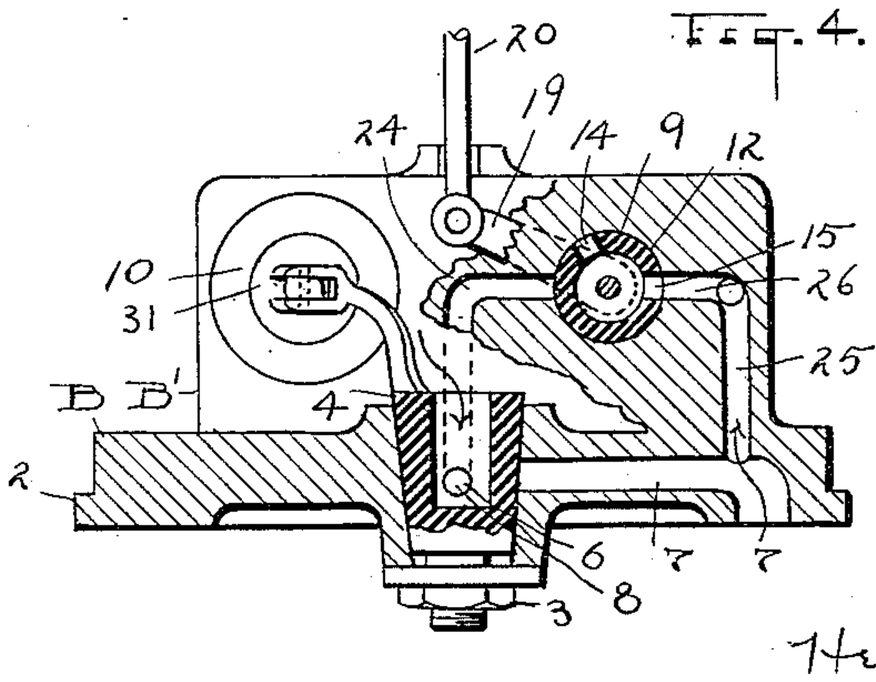

FIG. 4.

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R. B. Moser.

H. E. Mudra.

INVENTOR

Henry F. Schroeder

BY H. J. Fisher ATTY

UNITED STATES PATENT OFFICE.

HENRY F. SCHROEDER, OF CLEVELAND, OHIO.

HYDRAULIC PUMP.

SPECIFICATION forming part of Letters Patent No. 602,666, dated April 19, 1898.

Application filed December 17, 1896. Serial No. 615,969. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. SCHROEDER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hydraulic Pumps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to hydraulic pumps of the variety used to pump or compress air; and the invention consists in the construction, combination, and arrangement of parts, substantially as shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of an air-pump, showing my improved valve construction, the sectional view of the valve shown therein being taken substantially on line 1 1 of Fig. 2 to more clearly disclose the inlet and main valve. Fig. 2 is a cross-section on line 2 2 of Fig. 1 of the removable valve-casing and shows the valves in the positions they occupy when the plunger is rising under the pressure of water. Fig. 3 is a similar view, but showing the valves in the reverse position and when the plunger is descending and forcing out the water. Fig. 4 is a cross-section on line 4 4 of Fig. 3 with part of the valve-casing broken away. Fig. 5 is a perspective view of the auxiliary valve.

The advantages attained by my improved construction of valves, as shown in the foregoing views, are—

First, a valve which is above and independent of all considerations of water-pressure, high or low, and which will operate equally well with high and low pressure or with any intermediate pressure, and that without any special or separate adjustment to adapt it to local conditions, whatever they may be.

Second, the valves are so seated that they are unexposed except at their ports, thereby avoiding grinding on the seat and consequent leakage and are not made, as heretofore, with packing, &c., but are tapered and ground and made close in this way. Owing to this valve construction, I am enabled to use muddy river-water, as well as the clearest spring or well water, without affecting or injuring the working of the valves.

Third, the main valve, through which the water enters the piston-chamber of the pump, is and becomes in turn the outlet-valve also, and the said valve is governed and held in either inlet or outlet position by the full pressure of the water. This leaves the valve entirely under the control of water-pressure only and does not rely on springs, weights, or other mechanism to operate and control the inflow and outflow of the water.

Various forms of pumps embodying this valve construction could be used; but the form as herein shown is preferred for present purposes, and comprises, first, the base A, on which the valve-casing B rests. This valve-casing is held in place by the piston-chamber wall C, which is screwed into base A and upon edge 2, and by this construction the valve-casing B is rendered capable of being easily removed for repairs, cleaning, &c. The piston-chamber is divided into an air-chamber above and a water-chamber below the piston or plunger D, and an air vent and valve E, as is common, is located at the top of the air-chamber.

The valve-casing B, as here shown, is separate and distinct from the rest of the pump, and it contains and carries all the valves and their respective working parts. The main valve 4 is used to control the inflow and outflow of the water, as already indicated, and is located at the bottom of casing B and consists of a tapered plug working in a ground-seat and is held in place by a nut 3 at the bottom of the casing. This plug is hollow, but open at one end, and has ports 5 and 6 in its side, which correspond to the openings of the inlet 7 and outlet 8 and are placed at such an angle that when one port corresponds with either the inlet 7 or outlet 8 the other port is closed by the sides of the seat. When port 5 is open, the water flows through the plug 4 and into the water-chamber beneath piston or plunger D, and as long as the port 5 remains open the plunger D rises; but the plunger after rising to a certain height is utilized to reverse the plug 4 and cut off the inflow of water and open the exhaust-port 6 to correspond to the outlet 8. This is accomplished by an auxiliary valve 9 and valve-piston 10.

The auxiliary valve 9 is seated in part B′ of casing B and comprises a tapered plug 12, constructed to turn in a ground-seat. This plug has four separate and distinct ports or openings 13, 14, 15, and 16 and a stem 17. The plug 12 is hollow and open at each end, but has a partition 18 at its center, which divides the valve 9 in two parts, the ports 13 and 16 being on one side and the ports 14 and 15 being on the other side of the partition. The stem 17 projects through the casing B′, and an arm 19 is fastened at the end thereof to turn the plug in its seat. A rod 20 is fastened to the end of the arm 19, and this rod extends up and into a hollow tube in the plunger D. When the plunger D rises to a certain height, a nut 21 on the end of rod 20 is engaged by the bottom of the tube 22, carrying the arm 19 up to the position seen in dotted lines in Fig. 1. This turns plug 12 in its seat, and ports 13 and 14 match with openings 23 and 24. An inlet-duct 25 leads from inlet 7 to separate ducts 23 and 26, which lead to auxiliary valve 9 and correspond with ports 13 and 15. At the opposite side and in the center of casing B′ outlet-ducts 24 and 27 lead to the outlet or exhaust 8, and ports 14 and 16 in plug 12 correspond with these ducts. At the left of casing B′ a valve-piston 10 is contained in a piston-chamber 28, and ducts 29 and 30 lead from the auxiliary valve-chamber 12 to each side of the valve-piston 10. A stem 31, attached to piston 10, passes through casing B′ to a raised and extended arm fastened to the main valve or plug 4, and when the plug 4 is in the position as seen in Figs. 1 and 2 the plunger is rising through the pressure of the water which is passing from the inlet 7 through port 5, and the pressure of the water is also passing through duct 25, port 13 in plug 12, port 29, and behind piston 10, with its stem connected to arm of the plug 4. This keeps plug 4 in this position until the plunger rises to a certain height, when rod 20 is raised and plug 12 is turned in its seat, so that the flow of the water from duct 25 is reversed and is as seen in Figs. 3 and 4. Here it shows the water passing from duct 25 to duct 26, from duct 26 through port 15 to duct 30, and from there to the valve-piston 10. The piston in changing its position forces the water behind it to duct 29, port 16, and outlet-duct 27, and the piston in changing also reverses main valve 4, thus closing the inlet-port 5 and opening the outlet-port 6. The water-pressure is now still behind piston 10 and serves to keep the main-valve outlet-port 6 open until the water in the water-chamber is forced out by the weight of the plunger descending. When the plunger descends as far as desired, the piston at 32 strikes the end of rod 20 and reverses the auxiliary valve 9 to the position as again seen in Figs. 1 and 2. This movement is entirely automatic and will continue as long as the pressure is on, and by this construction I am enabled to use dirty river-water without harm or injury to the workings or life of the pump and can also use high or low pressure without adjusting my valves to local conditions. I not only utilize the maximum water-pressure without any loss, but also use the water-pressure to lock or hold the main valve in both the intake and exhaust positions until the plunger has reached its maximum working point, where it is adjusted to change or reverse the motion.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a pump having a removable casing, a main valve 4 having ports 5 and 6, a piston 10 to operate said main valve, an auxiliary valve 9 having a partition 18 dividing the same into two parts, and having ports 13 and 16 on one side and ports 14 and 15 on the other side of said partition, inlet and outlet ducts 7 and 8, respectively, in said casing, inlet-ducts 23, 25, and 26, communicating with ports 13 and 15 of valve 9 and outlet-ducts 24 and 27 communicating with ports 14 and 16 of valve 9, ducts 29 and 30 leading from the piston-chamber 10 to the auxiliary-valve chamber, and means connected to the plunger of the pump to operate the auxiliary valve, substantially as described.

2. In a hydraulic air-compressing pump, the outside casing, the removable valve-casing B set into said outside casing and having inlet and outlet water-passages through the same, a main valve with openings set into said base to control the direction of the flow of water, a piston set into said base and operatively connected with main valve, inlet and outlet water-passages in said base to opposite sides of said piston and an auxiliary valve to control the flow of water to said piston, substantially as described.

3. The pump having a removable casing in its bottom provided with two separate valve-chambers at right angles to each other and a piston-chamber and water-passages, in combination with a main valve 4 in one of said chambers and an auxiliary valve 9 in the other of said chambers, a piston and rod in said piston-chamber and an arm on said main valve engaged by said piston-rod, and a plunger in the pump connected with an arm of the auxiliary valve, substantially as described.

Witness my hand to the foregoing specification this 30th day of November, 1896.

HENRY F. SCHROEDER.

Witnesses:
H. T. FISHER,
R. B. MOSER.