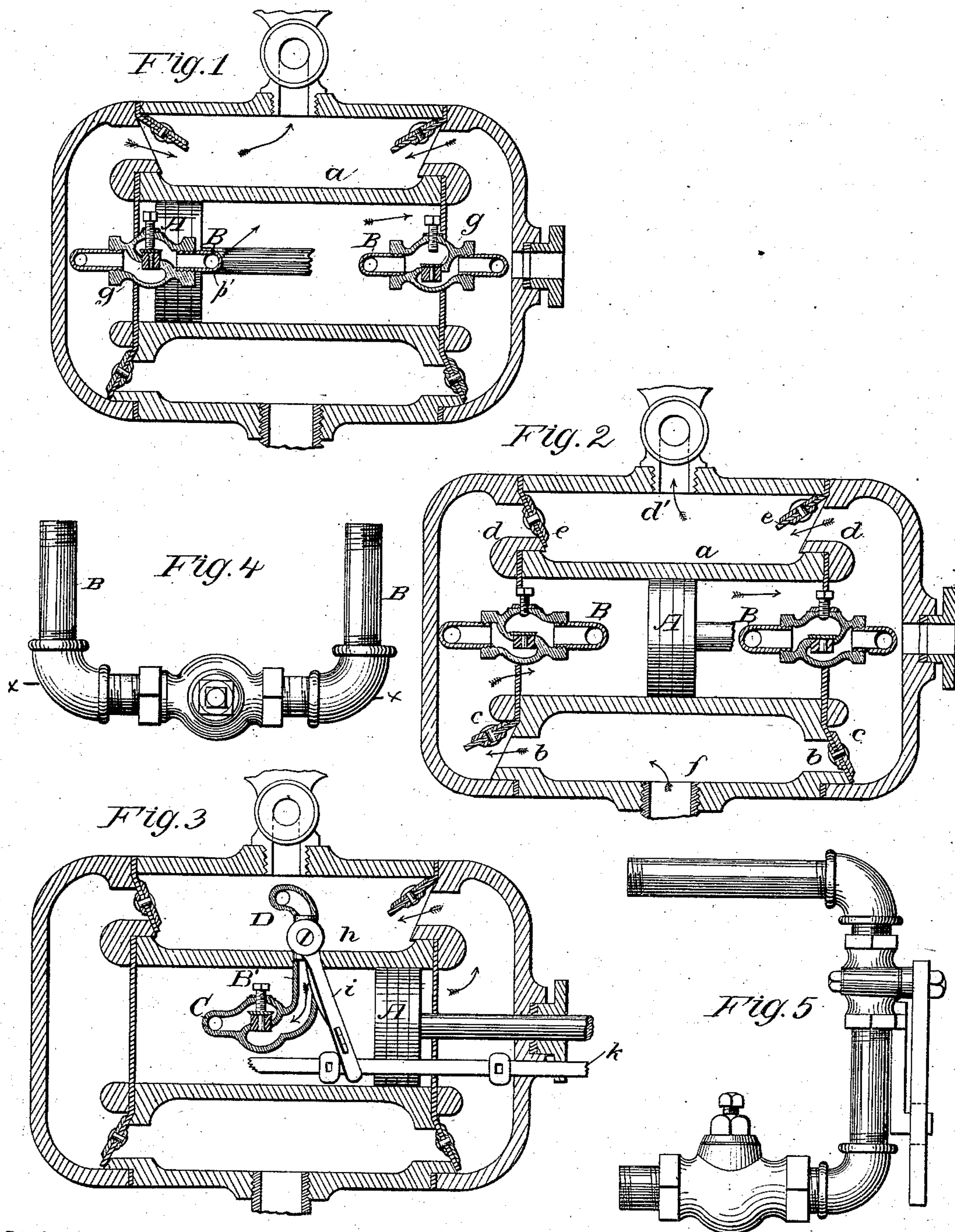


(Model.)

C. VERNIAUD.  
Force Pump.

No. 241,455.

Patented May 10, 1881.



Witnesses:  
L. V. Sney  
F. L. Middleton

Inventor:  
Claudius Verniaud  
by Ellis Spear  
Atty



# UNITED STATES PATENT OFFICE.

CLAUDIUS VERNIAUD, OF QUINCY, ILLINOIS.

## FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 241,455, dated May 10, 1881.

Application filed August 23, 1880. (Model.)

*To all whom it may concern:*

Be it known that I, CLAUDIUS VERNIAUD, of Quincy, Adams county, State of Illinois, have invented a new and useful Improvement in Force-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to force-pumps of that class in which a reciprocating piston operates in a cylinder in both directions to force the water through two sets of valves.

Heretofore when a pump of this class was forcing water under considerable pressure—say a hundred pounds (more or less) to the square inch in the discharge pipe or main—the piston necessarily acted with a pounding force upon a body of water in the cylinder at the beginning of each stroke before equalizing the pressure in the cylinder or chamber and the main so that the discharge-valve could open. As water is practically incompressible, this sudden movement of the piston at the commencement of its stroke against the body of water before putting it under pressure in the cylinder and chamber or pipe-connections causes a heavy jar at each stroke of the piston, and has made it necessary to limit such pumps in speed, in order to avoid the danger of bursting or breaking the heads of the pump-cylinders.

The object of my invention is to balance the piston of such a pump by equalizing the water-pressure in the cylinder before each stroke of the piston is completed, whereby the piston can be moved in either direction at any desired speed without causing violent jar and without undue strain upon the machinery.

My invention consists in admitting a part of the water from the cylinder or water-passage in front of the piston, when said piston is near the end of its stroke, into the cylinder in rear of the piston, whereby I equalize the pressure and open and close the valves just before the piston has completed its stroke.

My invention is illustrated in the accompanying drawings, in which Figure 1 shows a central longitudinal section of the cylinder, suction and discharge passages, and valves, the pipes and valves which control the supply of water from front to rear of the piston being also shown in another section upon the same

figure. Fig. 2 shows the same section with the piston represented in another part of its stroke. Fig. 4 is an enlarged view of the side conducting pipe and valve. Figs. 3 and 5 represent a modification of the invention.

In these figures, A represents the piston moving in a cylinder, *a*. The suction-passages are shown at *b*, and the suction-valves at *c*. The discharge-passages are represented at *d*, and the discharge-valves at *e*. The action of these parts does not differ in any respect from those heretofore used.

Connected with the cylinder is a pipe, B. (Shown in detached Fig. 4, and in section in Figs. 1 and 2, said section being on line *xx* of Fig. 4.) One of these pipes at each end connects the interior of the cylinder with the water-space at the end of the cylinder between the suction and discharge valves. The point of connection with the interior of the cylinder must be so located that the piston-head A will pass it just before the completion of its stroke. It will be understood, as represented in Figs. 1 and 2, that these pipes are the same at both ends of the cylinder. The pipes are chambered to receive a puppet-valve, *g*, to control the flow of water according to the movement of the piston-head A.

Supposing the piston-head to have passed from right to left in Fig. 1, forcing the water in that direction and closing the suction-valve and opening the discharge-valve on that side, while the valves upon the other side are in reversed position, the instant the said piston-head has passed the open end of the passage *p* in the cylinder, as represented in Fig. 1, the pressure of water in front of the cylinder will lift the valve *g* and admit the water into the cylinder behind the piston, thus equalizing the pressure upon both sides thereof, and closing the lower suction-valve and opening the discharge-valve on the right-hand end before the piston has reached the end of its stroke. The piston-head, therefore, at the end of its stroke is in exact equilibrium of pressure, and upon its return acts upon the body of water in the cylinder without shock or jar. The position of the piston-head upon its return from the position last described is shown in Fig. 2, which also illustrates the position of the valves. The position of the valves represented in Fig. 1 is



that which they assume before the piston has quite completed the end of its stroke toward the left, but after it has passed the cylinder port of the pipe B at that end.

5 It will be understood that the valve *g* in the pipe B is always closed while the piston-head is moving toward it, and until said piston-head has passed the inner or cylinder port of the said pipe.

10 In the modification shown in Fig. 3, instead of conducting the water from the passages at both ends of the cylinder and returning it into the cylinder, I make but one connection, B', and take the water from the discharge of the  
15 pump at D and conduct it to or near the center of the cylinder, as shown at D C in the said Fig. 3. In this figure D indicates the point at which the pipe takes water from the passage leading to the main, and C the point of dis-  
20 charge into the cylinder.

A valve located at *h* is operated by means

of an arm, *i*, and knobs on a reciprocating rod, *k*, moved by some suitable connection with the piston. The knobs are so adjusted that the valve is opened to admit water to the cylinder 25 near each end of the stroke of the piston.

Having thus described my invention, what I claim is—

1. The combination of the cylinder and piston, the pipe-connection between the water- 30 space outside the cylinder and the inside of said cylinder, and of the valves in said connections, all constructed and operating substantially as described.

2. The combination, with the cylinder *a* and 35 piston-head A, of the pipes B B, having valves *g*, substantially as set forth.

CLAUDIUS VERNIAUD.

Witnesses:

JAMES H. RINGGOLD,  
LESLIE C. WILLIAMSON.