

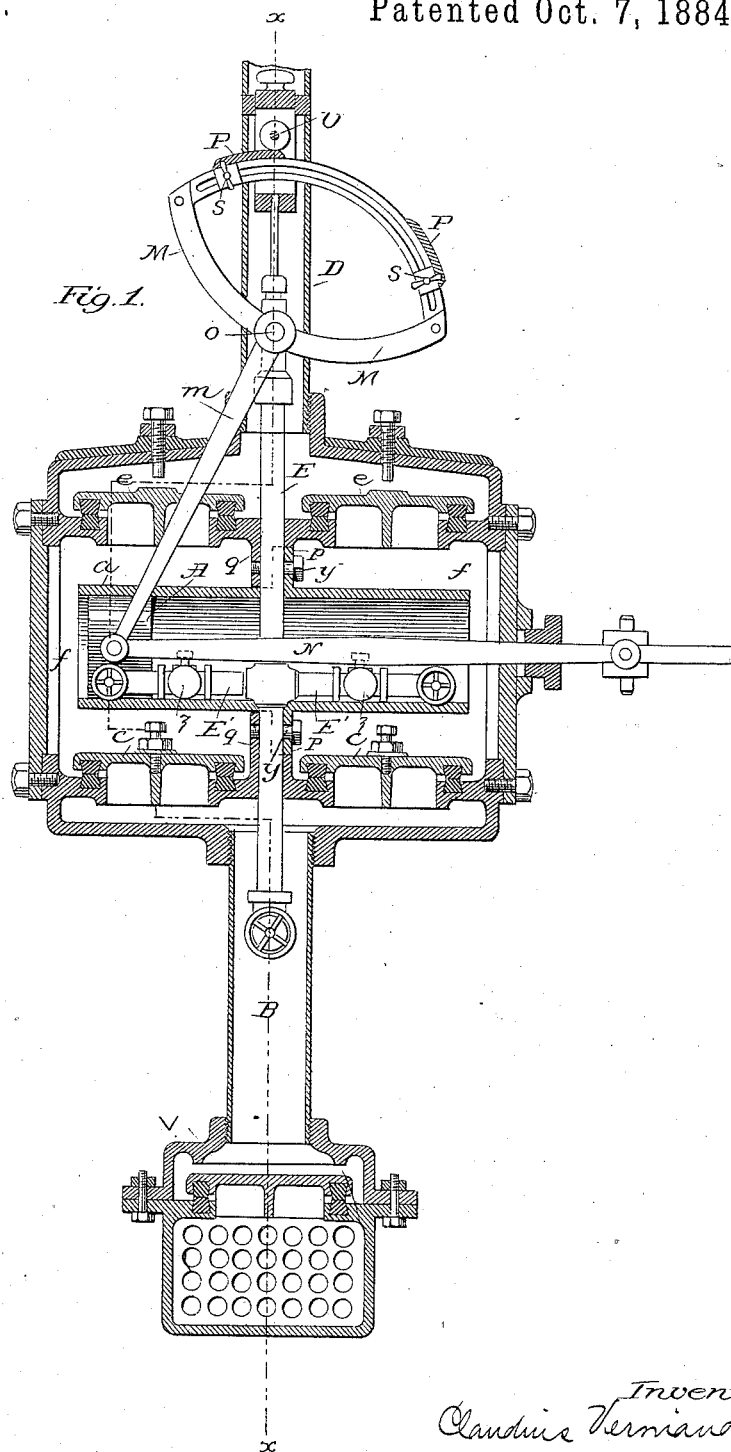
(No Model.)

2 Sheets—Sheet 1.

C. VERNIAUD.
PUMP.

No. 306,367.

Patented Oct. 7, 1884.



Attest:
[Signature]
F. L. Middleton

Inventor
Caudine Verniaud
by *[Signature]*
Attys.

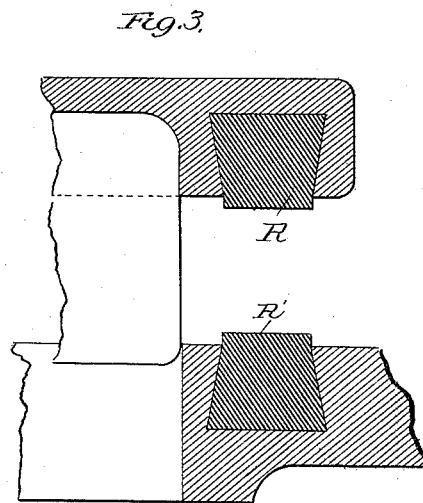
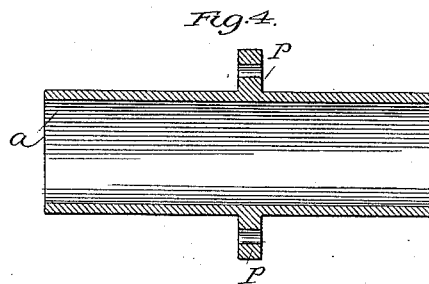
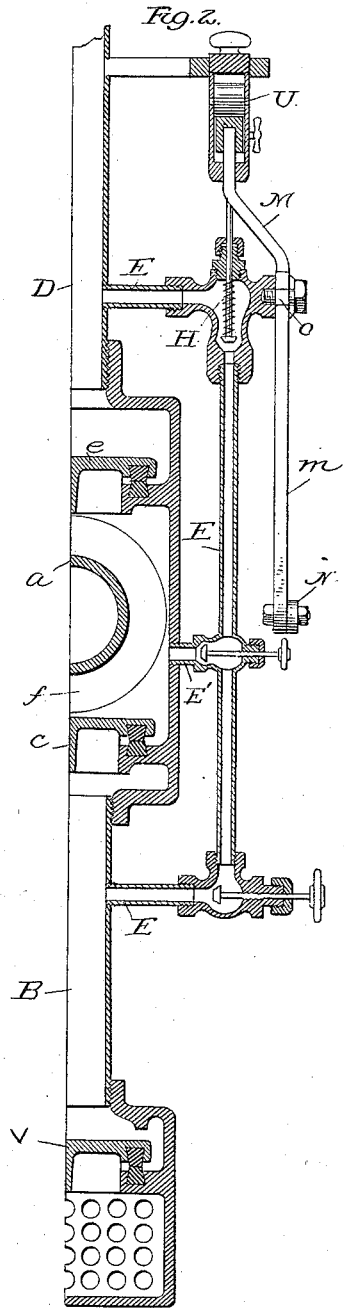
(No Model.)

C. VERNIAUD.
PUMP.

2 Sheets—Sheet 2.

No. 306,367.

Patented Oct. 7, 1884.



Attest:
Walter Middleton
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Claudio Verniaud
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UNITED STATES PATENT OFFICE.

CLAUDIUS VERNIAUD, OF QUINCY, ILLINOIS.

PUMP.

SPECIFICATION forming part of Letters Patent No. 306,367, dated October 7, 1884.

Application filed November 10, 1883. (No model.)

To all whom it may concern:

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

My invention is an improvement in force-pumps of that class in which a reciprocating piston operates in the cylinder to force water in both directions through suitable valves. In pumps of this class as heretofore made, when the water was forced under a considerable pressure—for example, at one hundred pounds (more or less) to the square inch in the discharge-pipe or main—and the pump was at a high rate of speed, the piston necessarily operated with a pounding action at the beginning of each stroke, and thereby dangerously slammed the suction and discharge valves to their seats. As water is practically incompressible, the heavy concussion upon the valves caused by the sudden reciprocation of the piston upon the body of water at each stroke has been unavoidable, and made it necessary to limit such pumps in speed, in order to avoid the danger of bursting or breaking of the valves, cylinder, or other parts of the pump. An attempt has been made to diminish the evil by dividing the concussion and pressure caused by the inequality of pressure above and below the valves. Among others, a number of valves were used in the place of one; but the use of a nest of valves involves many more adjustments, and necessarily adds greatly to the liability of derangement of the parts. Rubber-disk valves have also been used; but the rubber after a time becomes charged with oxide of iron arising from the corrosion of the metallic seats, with which they come in contact, and soon become hardened and glazed, so as to offer but little elasticity.

The object of my invention is to obviate the evils specified above by such a construction and arrangement of the parts as to equalize the water-pressure above and below the valves throughout the pump at the instant when the valves close, and balance all the suction and discharge valves just before the piston finishes its stroke, whereby the valves return to their seat quietly and without concussion or severe

jar, and I thus render it possible to run the pump at any desired speed and force against heavy pressure without concussion and excessive pressure upon the machinery.

My invention consists of a force-pump in which water is admitted from some part of the discharge-passage or the connection of such passage, an equivalent pressure into the suction-passage both above and below the suction-valve at each end of the cylinder, whereby the pressure on said valve is equalized and the valve closed quietly.

My invention further consists in special construction of the parts, whereby the principle of the invention is more effectively carried out.

My invention also consists of certain ancillary matters—to wit, an improved piston-cylinder and an improved valve-packing—all as fully explained hereinafter.

In the accompanying drawings, Figure 1 shows a central longitudinal section taken through the pump-cylinder and discharge and suction pipes, with some of the operating parts in side elevation. Fig. 2 represents a section taken on line *x x* of Fig. 1, the pipe connecting the discharge and suction pipes, with its branches, being also in section. Fig. 3 is a detail view of a valve and seats in section. Fig. 4 is a separate view in section of the piston-cylinder.

In the drawings the piston-cylinder *a* is represented as held centrally within the pump-cylinder *f* by connection with the central transverse partition dividing the pump-cylinder. Within the piston-cylinder is a piston, *A*, and there are discharge-valves *e e* and suction-valves *c c*, in diameter about equal to that of the piston, and of ordinary construction, except in respect to the seat, hereinafter explained. In the suction-pipe *B* is a check-valve, *V*. The discharge-pipe is shown at *D*. Connected with this pipe is a pipe, *E*, extending into the suction-pipe *B*, as shown clearly in Figs. 1 and 2. Branch pipes *E' E'* connect pipe *E* with each end of the pump-cylinder *f*. This pipe and these branches are provided with globe-valves, by means of which the amount of water admitted in the suction-pipe or the cylinder may be regulated.

In the upper part of the pipe *E* is a spring-valve, *H*, closed by the spring, and opened

through mechanism operated from the piston-rod. Any suitable means may be used for this purpose, and the point of connection with the moving parts of the pump is not material; but I have shown simple and effective means for this purpose. The spindle of the valve is provided with a head having an anti-friction roller, U, and under this runs a segmental bar held upon arms M of a lever, *m*, which is pivoted at *o*, and connected by a pivot to the pitman N, which is pivoted to the connection of the piston-rod. The segment is slotted longitudinally to receive tappets P, held adjustably in place by means of set-screws S. These tappets are adjusted so that when the piston is near the end of its stroke the tappet rides under the roller U and raises the valve H. This allows some of the water from the discharge-pipe D to pass through the pipe E, which is opened by the lifting of the valve H, and by the branch pipe E' into that end of the cylinder from which the piston is moving, thus instantly equalizing the pressure at that end above and below the valve *c*. A part of the water also passes through to the suction-pipe B through the pipe E, as shown, and closes the foot-valve therein. This should occur when the piston-head is within one-quarter of an inch of finishing its stroke. It will be understood that at this instant the foot-valve is closed by the water from pipe E, and that the suction and discharge valves, being in perfect equilibrium, will close by their own weight without concussion or jar. The valve H remains open until the piston-head A moves upon its return-stroke to the same relative position which it occupied when the action above described commenced. Then it will close and remain closed until the piston-head A is within one-quarter of an inch of finishing its stroke, when the other tappet will raise it to admit the water into the cylinder *f* at the other end and into the suction-pipe B, operating the other suction and discharge valves in the manner hereinbefore described. It will be plain that the return movement each way instantly permits the valve H to close, and allows the foot-valve in the suction-pipe to open, supplying water to fill the vacuum behind the piston.

In Fig. 3, showing an enlarged section of the valves, R R' represent rubber rings, of which R is set in the dovetail groove in the seat, and R' in a corresponding groove in the overhanging flange of the valve. The rings projecting from the grooves are adapted to meet and bear upon each other, so that the two rubber surfaces come together, and the rubber is not liable to become charged with the oxide of iron, and serves to make a tight joint, as well as to entirely obviate concussion, or to lose the elasticity.

The cylinder *a* is made detachable, and consists of a simple plain cylinder of any construction, having annular flange *p*, by means of which it is bolted to the annular flange *q* within the trunk or cylinder of the pump. It is bolted rigidly to the flange *q* by bolts *y*, and

the two flanges serve to hold the piston-cylinder *a* and form the partition between the ends.

In order to prevent the liquid from flowing over from one end of the pump to the other, I provide in the pipes E E' check-valves *z*, which have their seats in enlargements of said pipes, and open under pressure from the pipe E, but close under pressure from the end of the cylinder when pressure is on the end next to which they are located.

I do not limit myself to the special form of the cylinder or valves in respect to the leading feature of my invention, which is the general arrangement by means of which they are balanced, as heretofore explained.

I claim as my invention—

1. In a force pump of substantially the construction described, pipe-connection from the discharge-pipe into the space above and below the suction-valves, and a valve and means for operating the same, whereby liquid from the discharge-pipe is allowed to flow, near the end of the stroke, into the space on both sides of the suction-valve, as and for the purpose set forth.

2. In combination, a pump-cylinder, *f*, a piston-cylinder, *a*, suction and discharge valves *c* and *e*, a pipe E, connected to the suction and discharge pipes, and having branches E' E', and valve H, and devices, substantially as described, for automatically operating said valve, as and for the purpose set forth.

3. In combination with the cylinders *a* and *f*, a piston and its operating mechanism, the valves, suction and discharge pipes, and the pipes E E' E' and valve H, and segment-carrying tappets adapted to operate upon the stem *h* and lever *m*, with its arms M, and a pitman, N, substantially as described.

4. In combination with the piston-cylinder and piston of the described pump, with the discharge-pipe D and suction-pipe B, the pipe E, connecting said discharge and suction pipes, and the branches E' E', connecting said pipe E to the ends of the pump-cylinder *f*, the valve H, and the globe and check valves, all constructed and arranged substantially as described.

5. In combination with the valve H of the described pump, the segment with its arm and lever connected to the piston-rod, and adjustable tappets P P, substantially as described.

6. In combination with the valves and seats in the pump, the rings R R', secured thereto and projecting from the surface thereof, composed of rubber, leather, or other flexible material adapted to each other and forming bearings for the valves, substantially as described.

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

CLAUDIUS VERNIAUD.

Witnesses:

CHAS. OEHLMANN,
P. L. SCHMITT.