(No Model.)

2 Sheets—Sheet 1.

J. J. DE KINDER.

PUMP.

No. 335,111. Patented Feb. 2, 1886.

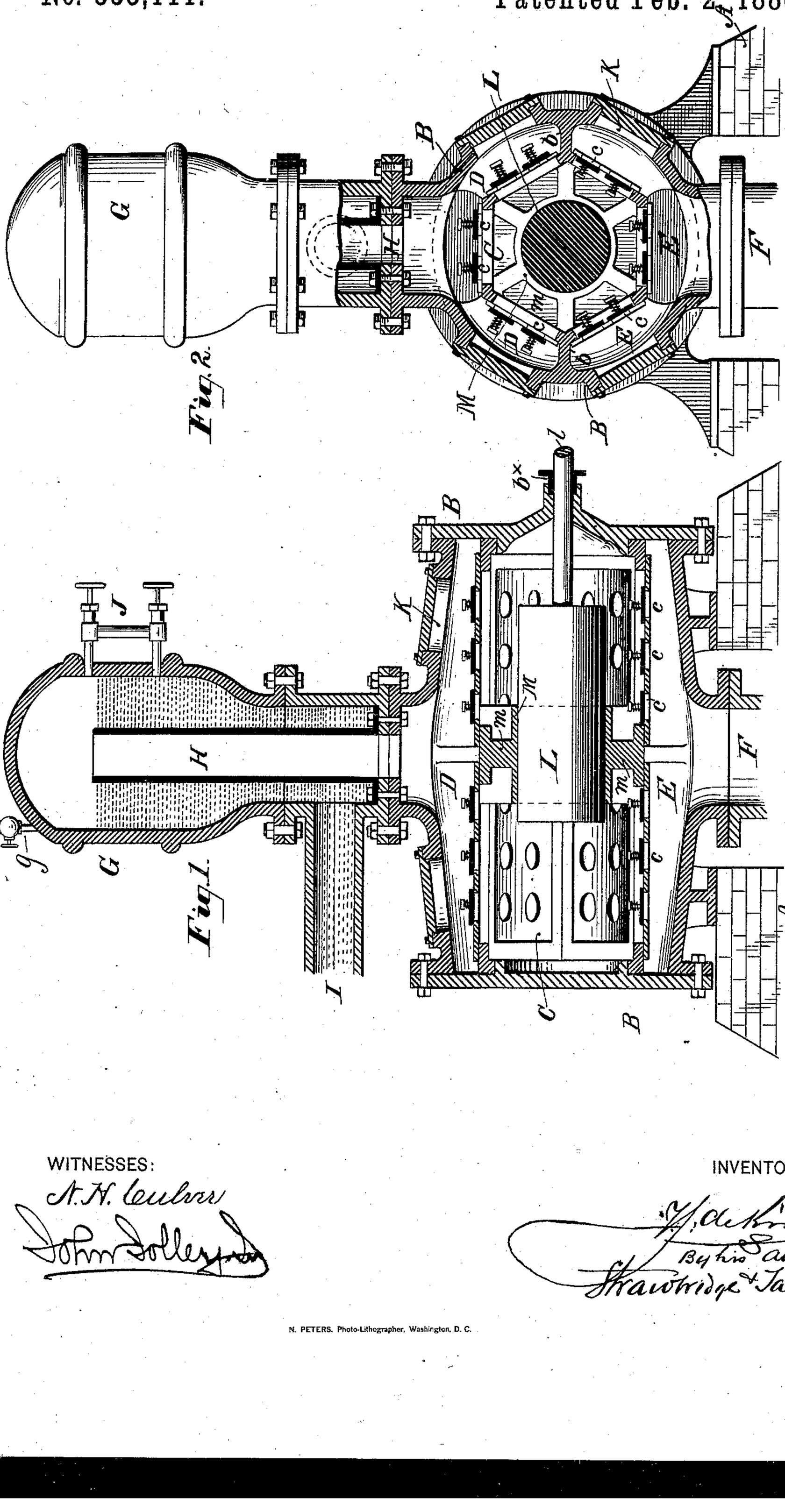

Fig. 2.

Fig. 1.

WITNESSES:

N. N. Culver

John Dolleyhide

INVENTOR

J. J. de Kinder.

By his Attorneys

Strawbridge & Taylor

(No Model.) 2 Sheets—Sheet 2.

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PUMP.

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Fig. 3.

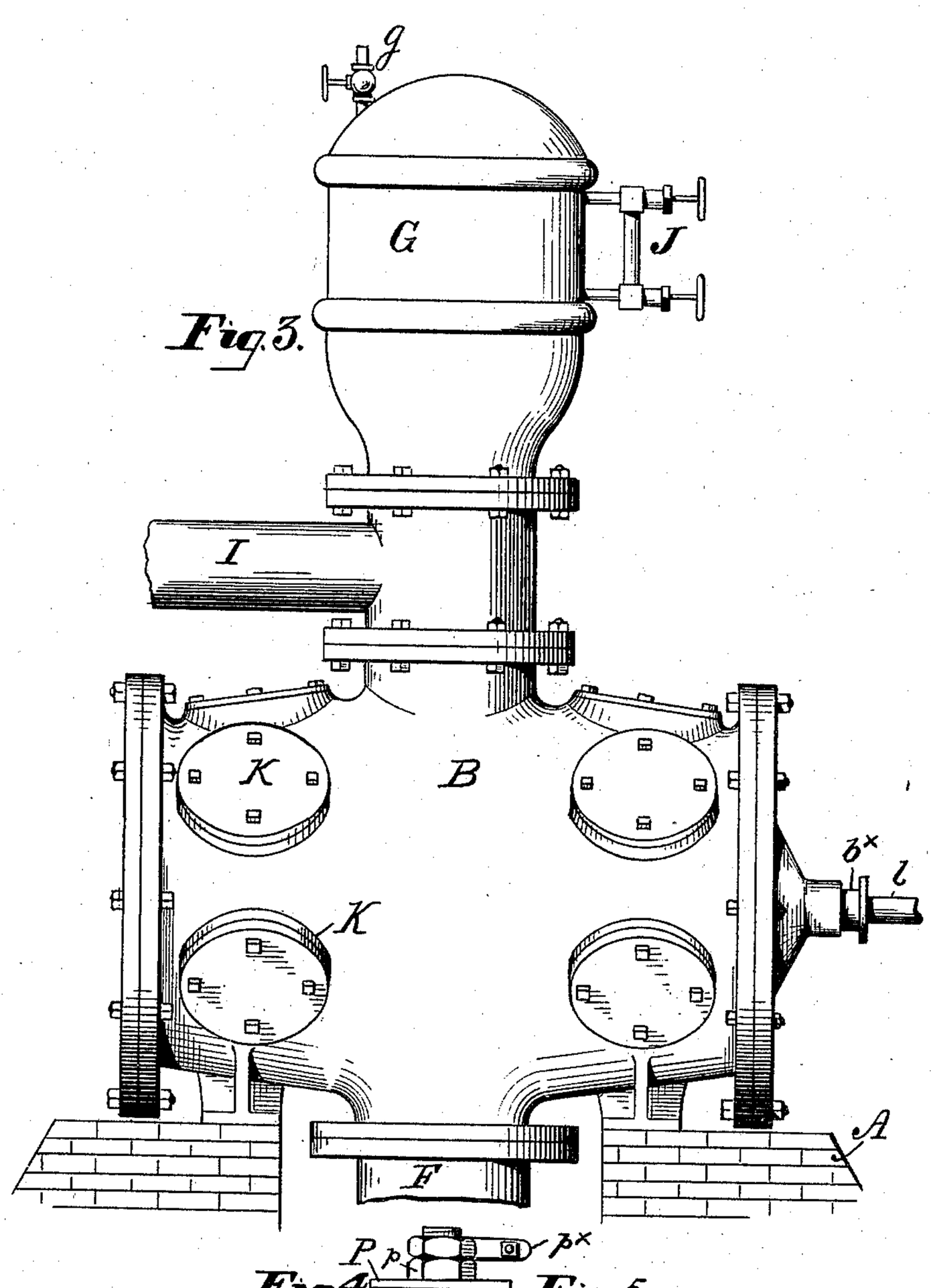

Fig. 4.

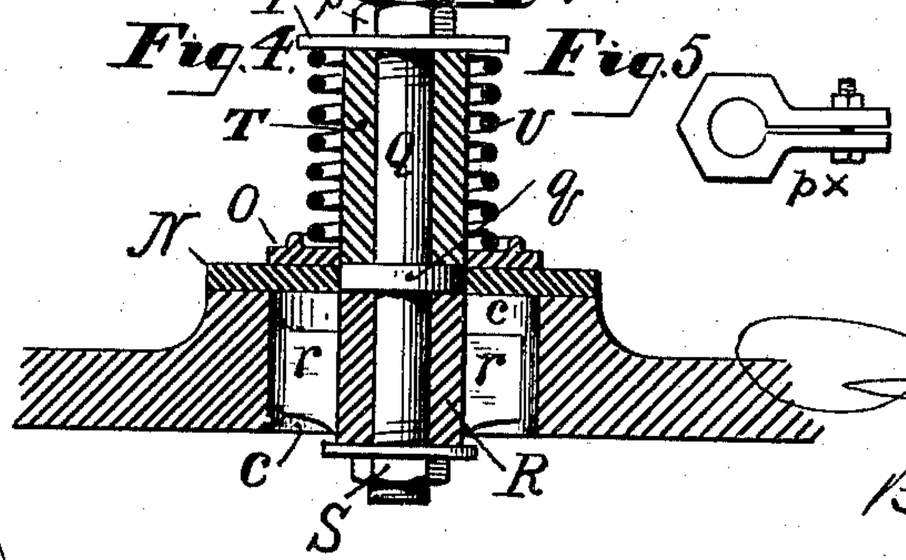

Fig. 5.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JOSEPH J. DE KINDER, OF PHILADELPHIA, PENNSYLVANIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 335,111, dated February 2, 1886.

Application filed March 20, 1885. Serial No. 159,531. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. DE KINDER, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented an Improved Pump, of which the following is a specification.

The object of my invention is the production of a continuously and uniformly acting pump, in which ample valve area is provided, and in which the rack of the plunger or piston is as far as possible cushioned, and the shock of the water on the valves diminished.

Apparatus embodying a good form of my improvement is represented in the accompanying drawings, and described in this specification, the particular subject-matter claimed as novel being hereinafter definitely specified.

In the drawings, Figure 1 represents in central longitudinal vertical sectional side elevation an apparatus embodying my improvements. Fig. 2 is an end partially sectional and partially elevational view of the same. Fig. 3 is a side elevation of the same. Fig. 4 is a fragmentary sectional detail of a good form of valve, and Fig. 5 is a plan of a jam-nut which I employ in said valve.

Similar letters of reference indicate corresponding parts in all the figures.

In the drawings, A represents a bed, upon which the pump, as an entirety, is mounted.

B is a horizontal pump-cylinder, which circumscribes a piston-chamber, C.

b b are horizontal partitions or diaphragms, which bridge the cylindric interspace between the interior of the pump-cylinder and the exterior of the piston-chamber, and which divide the said interspace into an upper compartment, which I term the "delivery-chamber," D, and a lower compartment, which I term the "suction-chamber," E.

F is an inlet-pipe, opening into the suction-chamber, and serving to supply the pump with the water or other liquid to be operated upon.

G is an air-chamber, of any preferred form, mounted upon the pump-cylinder, and containing a vertical delivery-tube, H, which leads from the delivery-chamber, and has its outlet near the crown of said air-chamber.

I is an outlet-pipe leading from the air-chamber, near the base thereof, and below the discharging-orifice of the delivery-tube. The air-chamber has no communication with the delivery-chamber, except by means of the delivery-tube.

The air-chamber G and the delivery-tube H together serve to relieve the valves from any shock arising from any cause—as, for instance, by sudden shutting off of the escape through the outlet-pipe I—and they serve this purpose by providing a compressible medium—viz., air—between the valves and the outlet. They also together serve to relieve the valves of the weight of water which would otherwise, where the pump was forcing to an elevation, be superimposed upon them.

g is an air-cock applied to the crown or upper portion of the air-chamber, and J is a gage or level applied to said air-chamber.

The pump-cylinder is provided with a series of man-holes, K, which afford access to the delivey and suction chambers.

L is an elongated plunger or piston, conveniently of cylindric contour, and having a bearing, M, within which it reciprocates, and which bearing is sustained in a transverse diaphragm, *m*, centrally erected within the piston-chamber, and dividing the latter into two compartments.

l is the piston-rod, which passes through a stuffing-box, $b^{\times}$, formed in one of the pump-cylinder heads. The piston is adapted to be reciprocated by any preferred means.

In the drawings I have represented the piston-chamber as of polygonal transverse section, it being externally a hexagonal prism, the sides of which are perforated with valve-ports *c*, provided with spring-controlled valves, preferably of a construction hereinafter detailed, and of which those controlling ports opening into the delivery-chamber open outward, while those controlling ports opening from the suction-chamber open inward and within the piston-chamber.

In Fig. 4 I have represented such a valve as I prefer to employ applied to one of the valve-ports. Its construction is this: Conveniently connected with the port *c*, preferably by means of a hub, R, and spider *r*, is a fixed valve-stem, Q, provided with a fixed circumferential flange, *q*, which rests, when the stem is introduced within the hub, upon the top of said hub, and is secured thereto by a nut, S,

or kindred fastening. Around the valve-stem is a removable bushing, T, which is adapted to be replaced as soon as worn out, and which is held in place by a washer-cap, P, secured upon the bushing and to the stem by a nut, *p*, and a jam-nut, $p^{\times}$.

The bushing is made of the same diameter as the hub and flange on the stem, and around it is fitted, so as to be free for movement thereupon, a loose valve-washer, N, upon which is superimposed a metal collar, O. Between this collar O and the washer-cap P is interposed a coiled spring, U, which serves ordinarily to retain the valve-washer down upon its seat upon the valve-port.

I do not herein claim or seek to cover the feature of a removable bushing upon a valve-stem.

Water forcing its way through the port about the spider operates upon the valve-washer so as to elevate it and compress the spiral spring, and so afford exit for the fluid.

All of the valves are preferably of the above description; but, as already stated, those which are applied to that portion of the piston-chamber which is above the horizontal diaphragms open into the delivery chamber or outward, while those which are applied to that portion of the piston-chamber which is below the horizontal diaphragms open away from the suction-chamber and into said piston chamber.

The precise construction and mode of application of the valve-stem to the port can of course be varied. I however prefer the construction which I above describe. The valve, however, consists, essentially, of the spring-controlled washer adapted to ride upon or have movement with respect to a fixed valve-stem formed in the preferred construction described by the removable bushing which surrounds the stem proper.

The areas of the suction and delivery chambers being about the same, the valves of both chambers are preferably made of the same size and have about the same lift, so that all racing of water through the delivery-valves is avoided.

Having thus described my improvements, their operation will be readily understood. Water or other liquid existing under pressure in the inlet-pipe and suction-chamber is in either advance stroke of the piston under the partial vacuum formed in one or the other compartment of the piston-chamber sucked alternately into said compartments, the lower set of valves being readily lifted by its pressure to admit it. Upon the return-stroke of the piston the water is forced out of the compartment into which it has been sucked, the upper set of valves of said compartment readily lifting for its escape, and the water is so alternately sucked from the suction-chamber into one compartment of the piston-chamber, while it is forced from out the other compartment into the delivery-chamber, out of which, through the delivery-tube, it is forced into the top of the air-chamber, from which it descends to the outlet-pipe.

In the operation of the device the water stands in the air-chamber up to about the level of the top of the delivery-tube, above which level the air-chamber is filled with air. The operation of the device, as will be readily understood, is therefore constant.

Having thus described my invention, I claim—

In a pumping apparatus, the following elements in combination: a pump-cylinder, a circumscribed piston-chamber, diaphragms interposed between the pump-cylinder and the piston-chamber and dividing the circumscribed interspace between them into a delivery-chamber and a suction-chamber, an inlet communicating with the suction-chamber, a delivery pipe leading from the delivery-chamber to within an air-chamber, an air-chamber, an outlet leading therefrom below the delivering-orifice of the delivery-pipe, a piston bearing within the piston-chamber, a transverse diaphragm for supporting said bearing and dividing the piston-chamber into two compartments, a piston-plunger adapted to reciprocate in said bearing and with respect to the said two compartments, valve-ports in both compartments of the piston-chamber opening through the walls thereof, respectively, into the delivery-chamber and into the suction-chamber, valves opening into the piston-chamber and applied to the ports thereof which communicate with the suction-chamber, and valves opening into the delivery-chamber and applied to the ports of the piston-chamber which communicate with said delivery-chamber, substantially as shown and described, and for the purpose specified.

In testimony whereof I have hereunto signed my name this 13th day of March, A. D. 1885.

JOSEPH J. DE KINDER.

In presence of—
J. BONSALL TAYLOR,
JOHN JOLLEY, Jr.