

(No Model.)

S. W. MARTIN.
PUMP.

No. 339,445.

Patented Apr. 6, 1886.

Fig. 1.

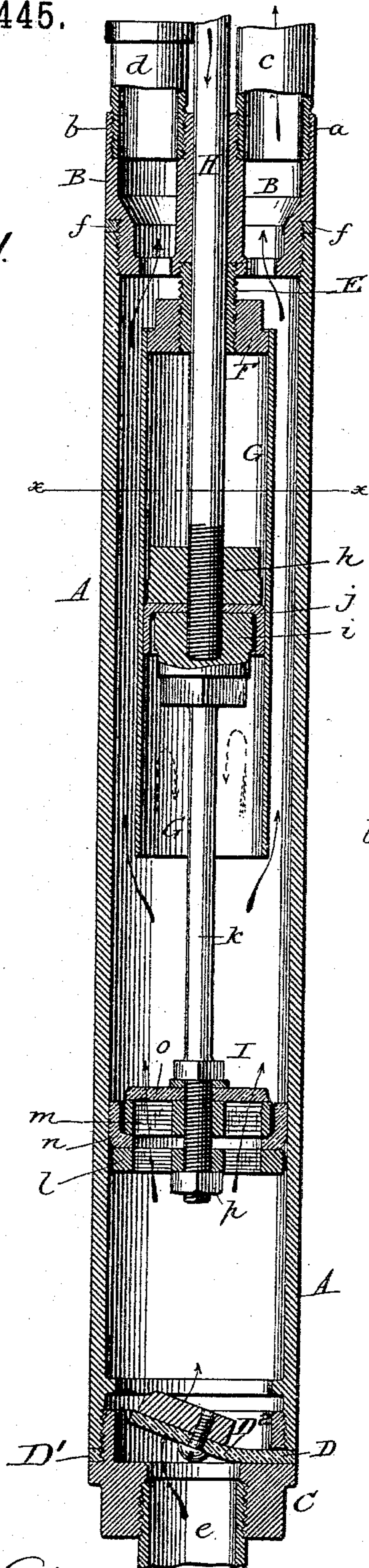


Fig. 3.
on line x-x

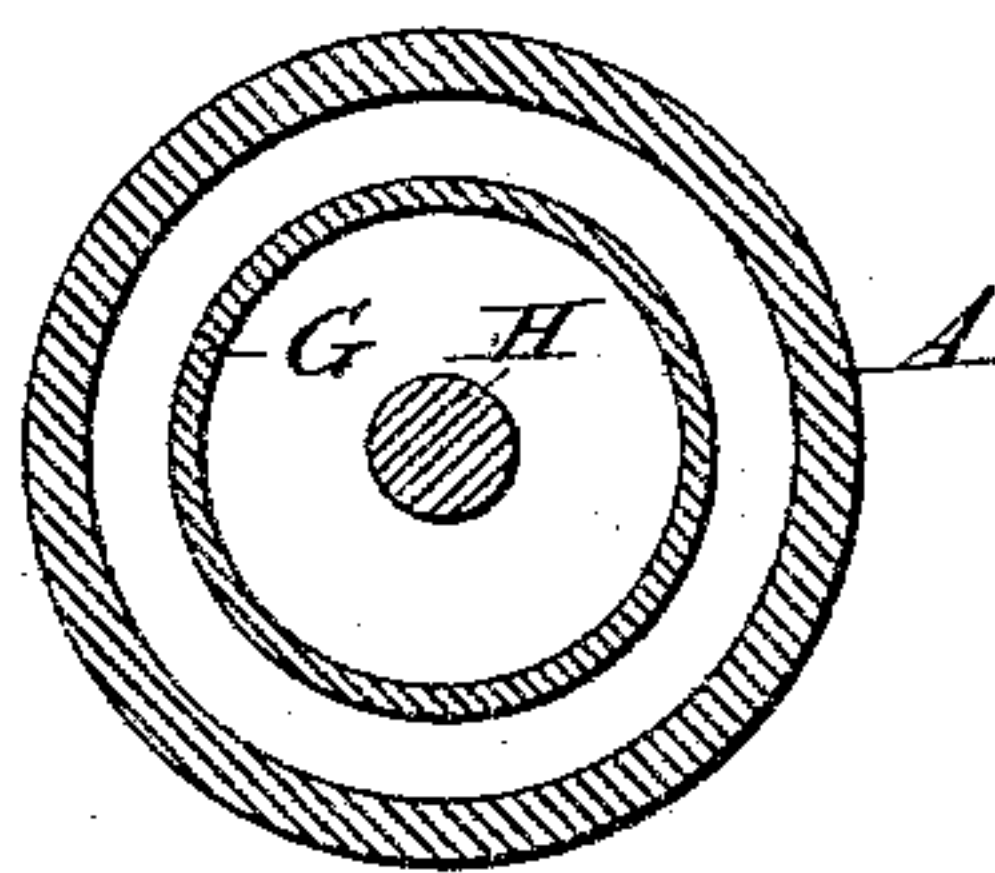


Fig. 2.

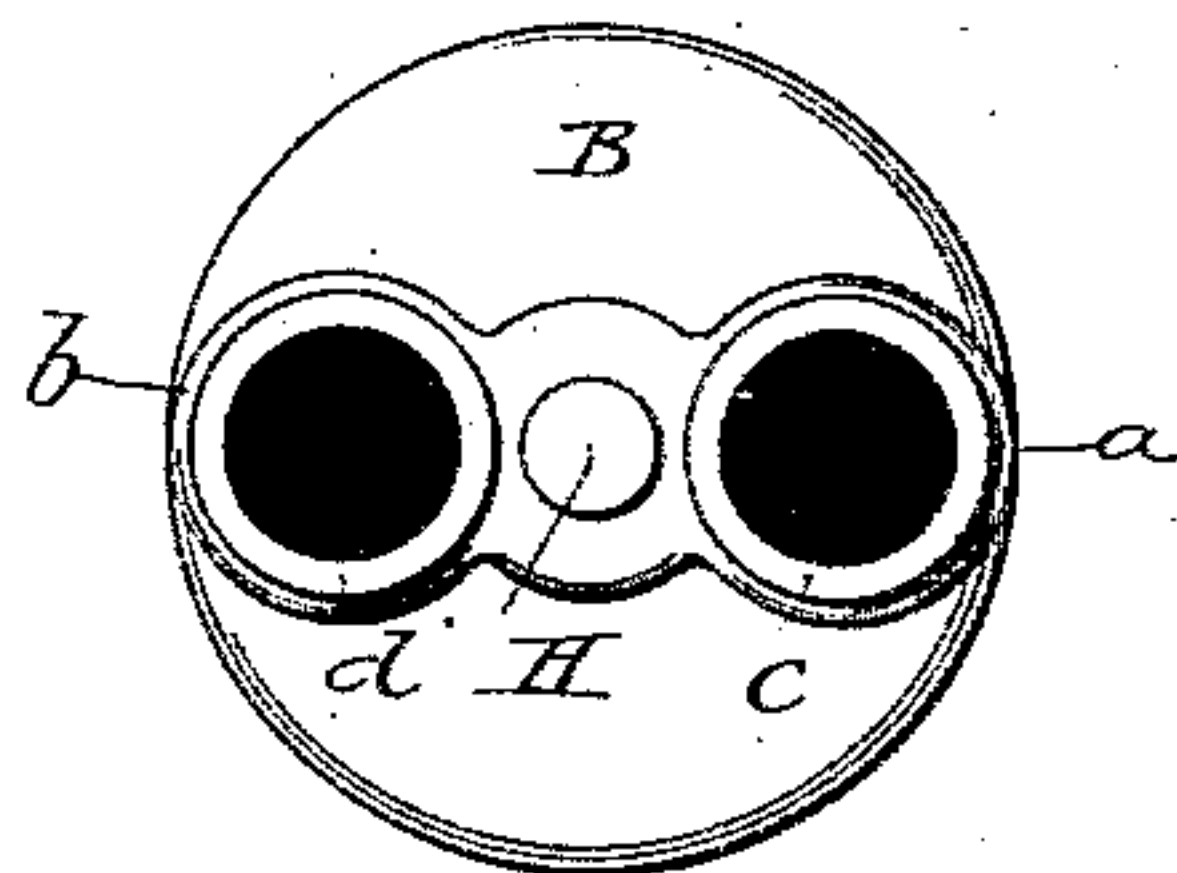
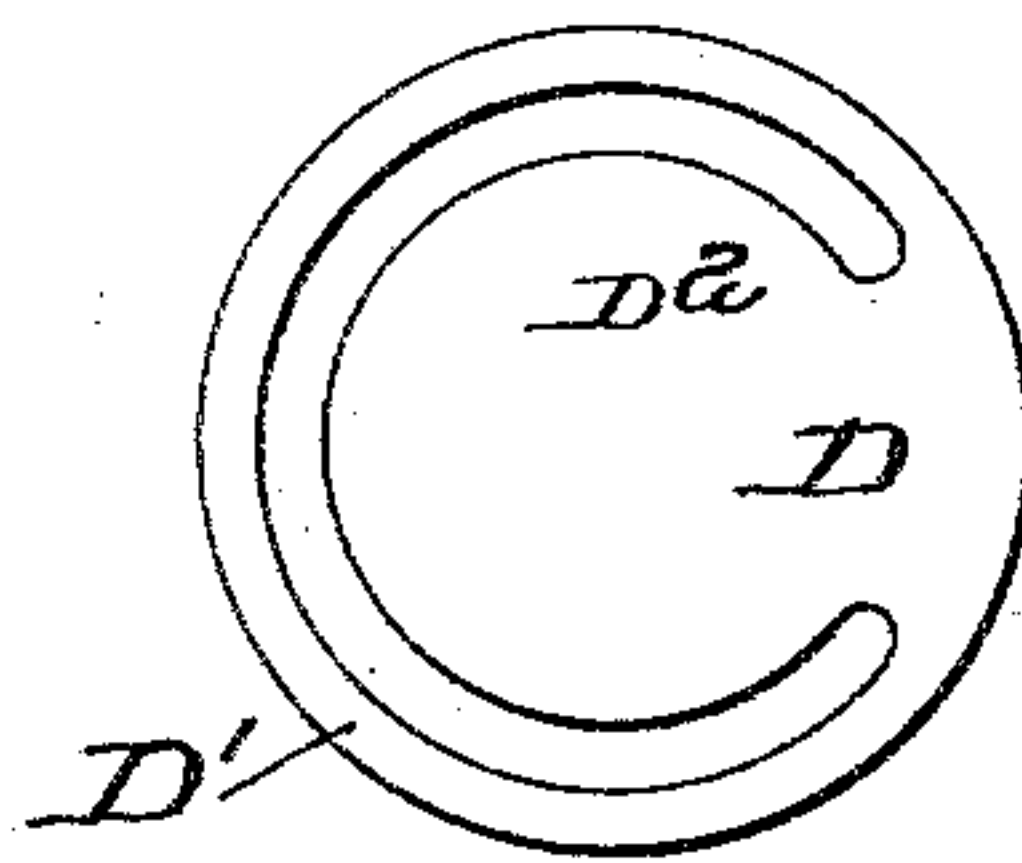


Fig. 4.



WITNESSES

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PUMP.

SPECIFICATION forming part of Letters Patent No. 339,445, dated April 6, 1886.

Application filed June 30, 1885. Serial No. 170,294. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. MARTIN, of Springfield, in the county of Clark and State of Ohio, have invented certain Improvements in Pumps, of which the following is a specification.

My invention relates to improvements in the construction of that class of double-acting force-pumps which contain two barrels and pistons of different diameters; and the invention consists in various peculiarities of construction, hereinafter described and claimed, whereby the pump is adapted for introduction into wells of small diameter, its construction simplified, the cost reduced, and the parts adapted for convenient adjustment.

Figure 1 represents a vertical central section of my pump; Fig. 2, a top plan view of the pump-cylinder and its connections; Fig. 3, a cross-section on the line *x x*. Fig. 4 is a top plan view of the combined packing and valve detached.

A represents the body or barrel of the pump, of cylindrical form both externally and internally. At its upper end the barrel is threaded internally, to receive the neck or tenon of the cap B, which is constructed with an axial hole for the piston-rod and with two necks, *a* and *b*, to receive the supporting and delivering pipes *c* and *d*, respectively, these necks communicating through direct passages or openings with the interior of the barrel. The lower end of the barrel is threaded internally to receive the neck or tenon on the foot-piece C, which has a central external threaded port to receive the supply-pipe *e*. The cap B and the foot-piece C are both finished flush with the periphery of the barrel. An annular packing-ring, *f*, encircles the neck of the cap B, and being compressed between the end of the barrel and the shoulder of the neck prevents leakage at that point. Leakage between the lower end of the barrel and the foot-piece C is prevented by the outer edge or ring, *D'*, of a leather or other flexible disk, *D*, made in the form represented in Fig. 4, to serve the twofold purpose of a packing and a valve. It will be observed that the central portion, *D²*, of the disk, which constitutes the valve, is nearly separated from the remaining portion

by a circular slot or incision, leaving but a narrow point of connection at one side, so that the central portion, which serves as a valve, is free to rise and fall. The internal or ring-like portion of the disk is adapted to encircle the neck of the foot-piece C and bear between its shoulder and the end of the barrel, while the valve portion extends inward through a slot or opening in the flange of the foot-piece, so as to overlie the inlet-port or valve-seat. The valve portion may be loaded as shown in the drawings, or in any other appropriate manner.

I am aware that flexible valve-seats are old; but I believe myself to be the first to construct and apply a flexible disk in such manner as to serve the purpose of a central valve, and also serve as a packing of a neck outside of a neck which enters the pump-barrel.

Into the lower end of the cap B, I screw a central tube or sleeve, E, the lower end of which is threaded into and serves to sustain a cap, F, which is in turn secured within and adapted to sustain a secondary cylinder or barrel, G. This secondary barrel is made of a diameter considerably less than that of the external barrel, and is extended downward a considerable distance within the latter, and is left open at the lower end.

Centrally through the cap B and tube E, I insert loosely the piston-rod H, the upper end of which may be connected with a lever, crank, or other appropriate operating device. The lower end is threaded and extended through an upper nut, *h*, into a nut, *i*. Between these nuts is confined a leather or other flexible packing, *j*, the nuts and packing forming jointly a piston which fits tightly within the secondary barrel. The lower nut, *i*, is secured to or formed upon the upper end of a rod, *k*, the lower end of which is extended downward below the secondary barrel and passed through a piston, I, which fits closely within the main barrel. This piston consists of perforated top and bottom plates, *l* and *m*, which confine between them the inner edge of the annular packing *n*, of leather or equivalent material, the periphery of which is turned upward around the plate *m*.

On top of the plate *n* there is a flexible disk,

o, of leather, rubber, or equivalent material, serving as a valve. The rod *k* has a shoulder at the upper end of its threaded portion, and is inserted downward centrally through the various parts of the piston, and provided with a nut, *p*, on its lower end, this nut serving to bind the several parts firmly together.

The operation of the pump is as follows: The movements of the piston-rod cause the two pistons to rise and fall in unison. As the pistons descend, the valve *D* closes, and the water contained in the base of the barrel *A* flows upward through the piston *I* past its valve *o*. The upper piston, descending at the same time, expels the water from the lower end of the secondary barrel *G*, whence it passes upward around the exterior of said barrel, through the upper end of the main barrel, and through the discharge pipe or pipes *c* at the top. During the rise of the pistons the valve *o* closes, compelling a portion of the water in the main barrel to flow upward around the secondary barrel to the discharge-pipes, and also compelling the remaining portion of the water to seek the interior of the secondary barrel *G* beneath its piston, which rises to afford space therefor. During this action water flows past the valve *D* into the base of the barrel below the main piston.

From the foregoing it will be understood that the pump acts positively to expel the water during both the downward and the upward movements of the pistons.

It is to be observed that the cap *B* and foot-piece *C* are finished flush with the exterior of the barrel, and that all the connections are brought within the line of the circumference of the barrel, so that the entire pump may be lowered into a well the diameter of which is equal to that of the barrel. This construction is highly advantageous in that it permits the use of the pump in drilled or piped wells of small diameter.

I am aware that pumps having two pistons attached to a single rod and operating in connection with cylinders of different diameters, one of which is located within the other, are known in the art; but I believe myself to be the first to construct and organize the parts in the manner herein represented.

Among the peculiarities of my pump are to be noted the manner of constructing the cap to permit the application of the delivery pipe or pipes at the top within the circumference of the body; the fact that the water is allowed a direct and practically straight passage through the pump from one end to the other; the fact that the lower valve serves both as a valve and as a packing; the fact that no gland or stuffing-box is required around the piston-rod *H*, and the fact that the single central

shouldered screw on the rod *k* serves not only to confine the valve in place, but also as a means of confining the external packing.

Water may be discharged through both pipes *C* and *D*; but I commonly close the upper end of one of these pipes by a cap or block, as shown in the drawings, thus transforming it into an air-chamber, to prevent concussion within the circumference of the body.

The connection of the barrel *G* to the cap of the main barrel by means of the tube *E* is advantageous in that it affords space for the passage of the water inward above the top of the cylinder *G* to the delivery-ports, so that these ports may be formed within the cap *B* without enlarging the latter beyond the diameter of the main cylinder.

It is to be observed that my construction permits the cylinder and its connections to be given a constant diameter, or, in other words, a flush surface from one end of the pump to the other—a feature of great advantage in that it permits the use of the cylinder of the full diameter of the well, and consequently permits in small bored or tubed wells the use of a pump of greater capacity than is possible under ordinary constructions.

Having thus described my invention, what I claim is—

1. The main cylinder, the cap *B*, screwed within the cylinder and flush externally therewith, with the vertical ports in its interior, in combination with the internal cylinder closed at its top and connected with the cap by the tube *E* of smaller diameter, as shown and described, whereby the reduction of the cap to enter the cylinder is permitted without reducing the size of the ports or impeding the upward passage of the water therethrough.

2. In combination with the internally-threaded barrel *A*, and the foot *C*, having an externally-threaded flange with an opening in its side, the flexible sheet *D*, having its central portion inserted through and within the flange, and its peripheral portion extended around the same.

3. In a force-pump, the combination of the main barrel, the top screwed therein flush with its exterior and provided with internal vertical ports, the pipes *c d*, screwed into the cap within the circumference of the pump, the internal cylinder closed at its top and suspended from the cap *B* by the cylindrical connection *E*, the piston-rod *H*, and the two pistons connected therewith.

In testimony whereof I hereunto set my hand in the presence of two attesting witnesses.

SAMUEL W. MARTIN.

Witnesses:

J. W. CRANE,
W. M. JOHNSTON.