(No Model.)

B. C. VANDUZEN.

FORCE PUMP.

No. 377,054. Patented Jan. 31, 1888.

Fig. 1.

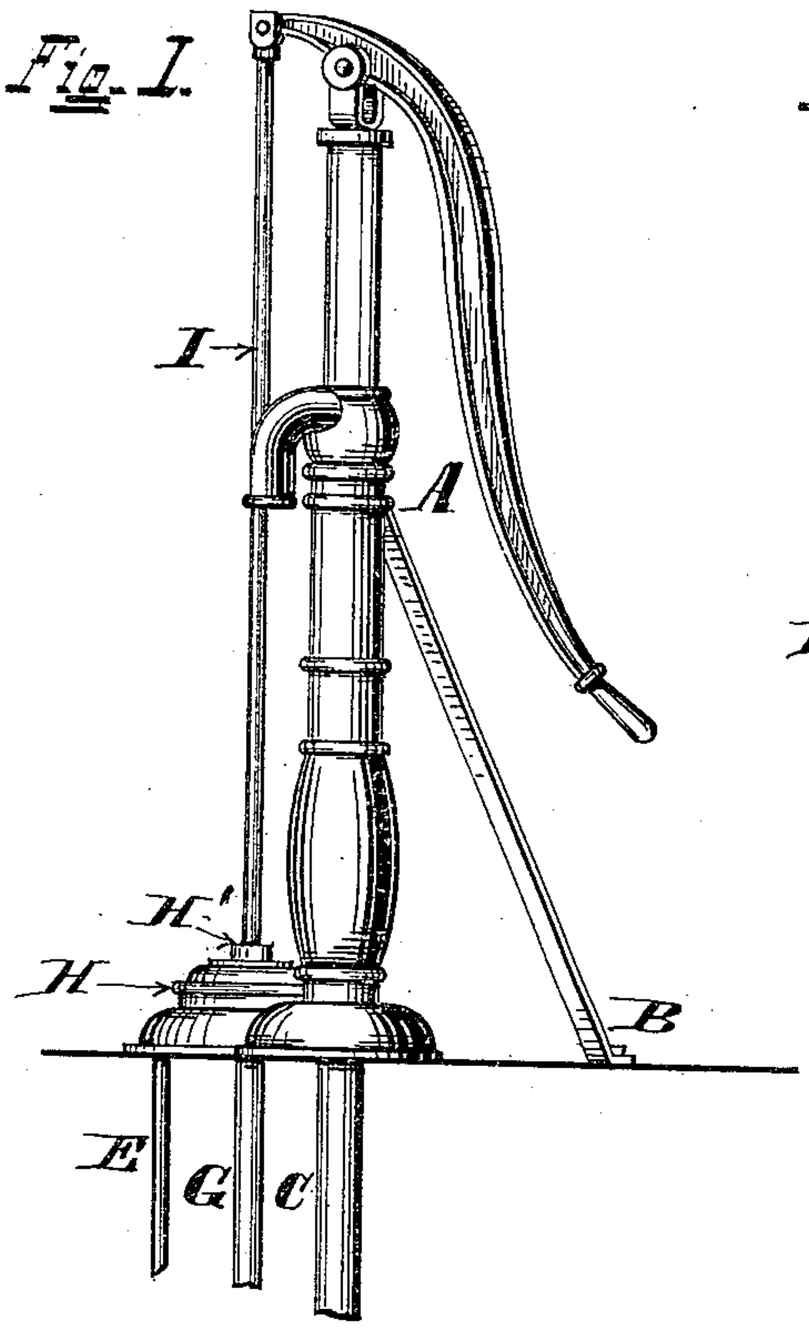


Fig. 2.

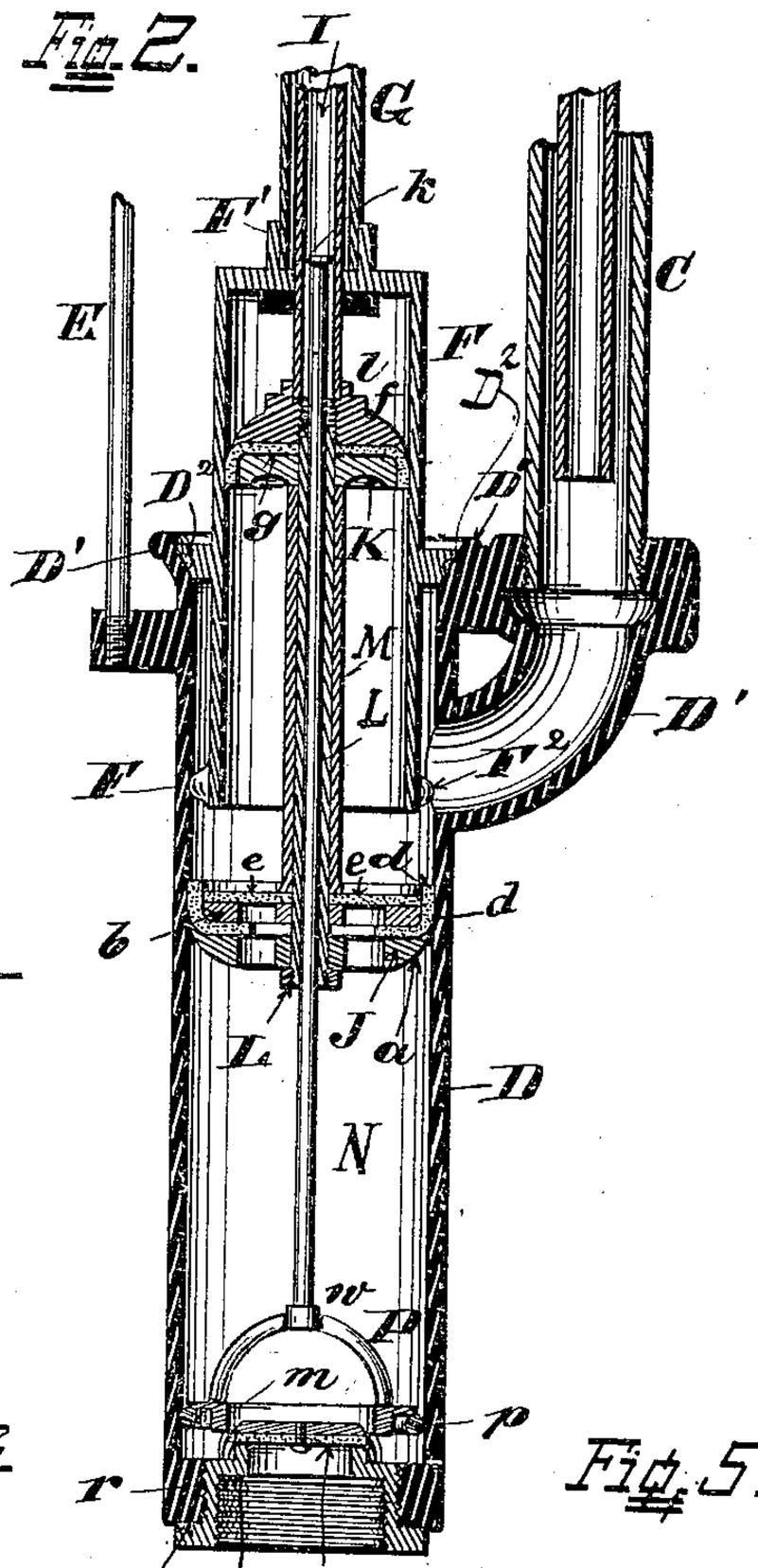


Fig. 3.

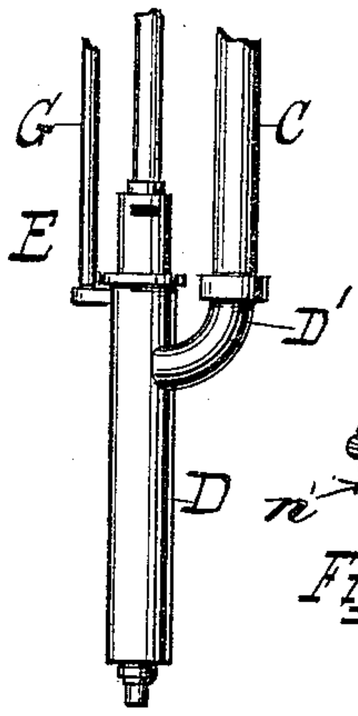
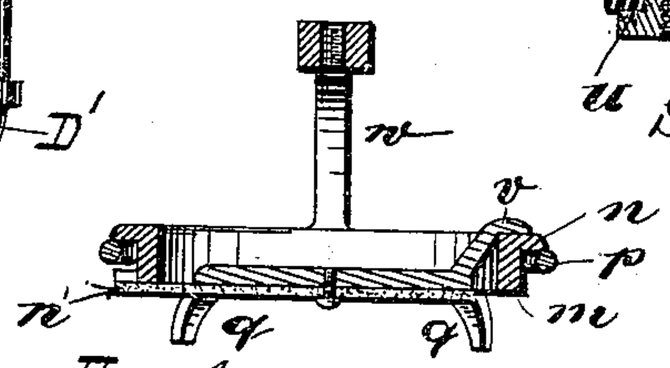


Fig. 4.



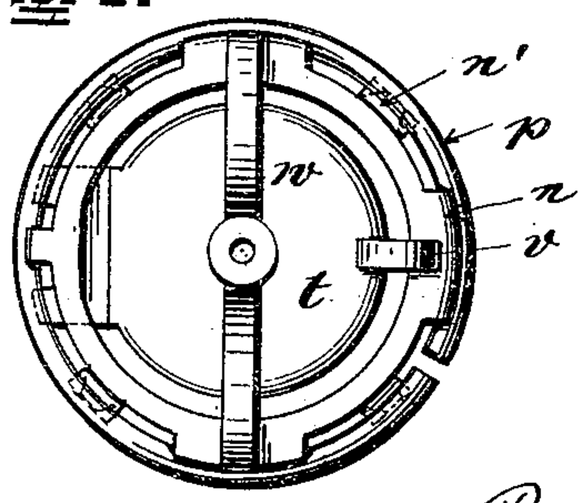
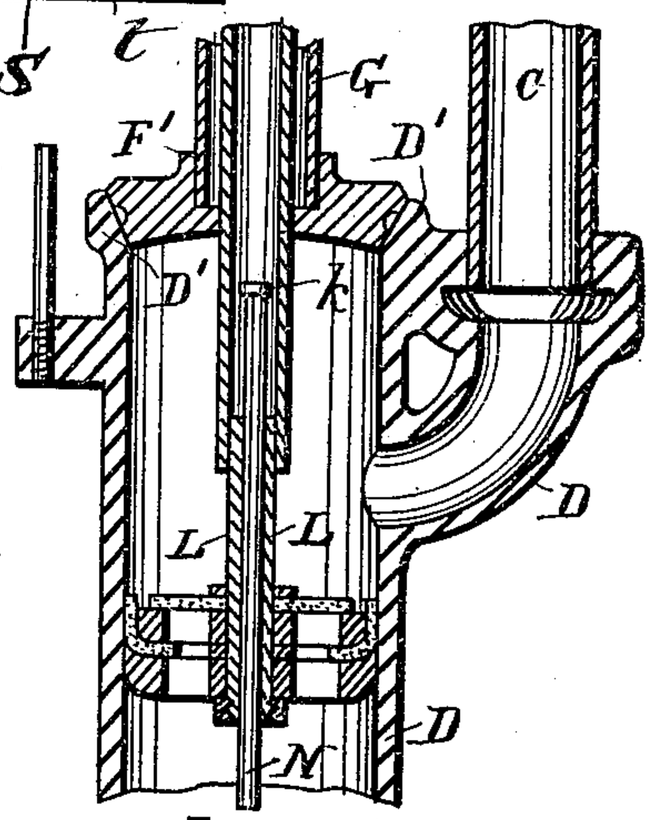


Fig. 5.



Attest
O. M. Hill
Jno. C. Steele

Inventor
Benjamin C. Vanduzen,
by Wm. Hubbell Fisher, Atty.

UNITED STATES PATENT OFFICE.

BENJAMIN C. VANDUZEN, OF WINTON PLACE, OHIO.

FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 377,054, dated January 31, 1888.

Application filed June 30, 1884. Serial No. 136,479. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN C. VANDUZEN, a resident of Winton Place, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Force-Pumps, of which the following is a specification.

My improvements are applicable not only to various descriptions of single-acting pumps, but also to various kinds of double-acting pumps.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

For convenience of illustration I will now proceed to describe my invention as applied to one description of double-acting force-pumps.

In the accompanying drawings, Figure 1 represents a side elevation of said pump. Fig. 2 represents a vertical central section taken through the discharge-pipe and the stay-rod. Fig. 3 represents a vertical central section of the drop-valve, taken at right angles to the vertical plane of the section shown in Fig. 2. Fig. 4 represents a plan view of the drop-valve, but showing the surrounding spring in dotted lines. Fig. 5 is a vertical central section of a modification.

A indicates a standard of any preferred construction, in the present illustration set upon a platform or suitable support, B.

C indicates the discharge-pipe, suitably supported. The discharge-pipe in the present illustration is screwed or otherwise connected to the main cylinder D, or to a branch, as D′, of said cylinder D, as shown. In the present illustration the main cylinder D is supported at one side by the discharge-pipe C and at the other side by a stay-rod, E.

In the upper part of the main cylinder D is located the forcing-cylinder F. This cylinder F is connected to the main cylinder D in any suitable manner which allows of the cylinder F being lifted up and withdrawn from the main cylinder D. In the present illustration the upper and open end of cylinder D has a flare, D′, extending upward and outwardly, and in this flare rests an annular flange or collar, F′, of cylinder F, arranged to allow suitable packing to be placed between the collar F′ and the inner surface of the flare D′. In the present instance an elastic ring packing, D^2, is shown. The cylinder is kept down in place by suitable means—as, for example, by a pipe, G, extending up and into a base or equivalent part, H, and is then held down to place by means of a hollow nut, H′, screwed into the base. Through this nut plays the actuating-rod I. Preferably the lower end of the pipe G rests within an annular flange or recess, F′, of forcing-cylinder F.

The lower end of the forcing-cylinder F is steadied by suitable means—as, for example, by projections F^2, placed at suitable intervals upon the periphery of said cylinder F.

Located in main cylinder D is the main or suction piston J, constructed in such a manner that it can be readily withdrawn from said cylinder or reinserted therein without displacement of its packing or injury thereto.

Located in the forcing-cylinder F is the forcing-piston K, constructed in such a manner that it can be readily withdrawn from said cylinder F or reinserted therein without displacement of its packing or injury thereto. The suction-piston J is connected to the forcing-piston K by means of a pipe or tube, L, which is screwed or otherwise secured to the upper part or disk, *f*, of the forcing-piston K, and passes down through the piston J, and has a nut, L′, screwed onto its lower end, and upon this nut rests the lower part of the piston J. The two pistons are rigidly kept apart by means of a tube, M, or other means intervening between the said pistons.

The preferred form of construction of the lower piston is as shown—viz., a lower disk, *a*, upper disk, *b*, separated by a packing, *d*, held tightly between them, and the outer edge of this packing *d* bends upward and lies between the upper disk and interior surface of main cylinder D. On upper disk, *b*, lies a discal valve, *e*, preferably flexible, and secured between the upper face of disk *b* of piston J and the lower end of tube M.

The preferred construction of the forcing-piston K is as follows: It has an upper disk, *f*, and a lower disk, *g*. The lower disk, *g*, is loose upon pipe or tube L. Between disk *f* and disk *g* is a packing, *h*, whose outer edge is turned downward and is between the periphery of the lower disk, *g*, and the interior

surface of the forcing-cylinder F. The actuating-rod I, for a distance above the forcing-piston K, is preferably hollow, for the purposes now to be described.

Through the tube L plays a rod, N, and the upper end of this rod extends up into the tubular portion of the actuating-rod. The lower end of the rod N extends down below the suction-piston J, and is connected to a drop-valve, P, of any suitable description, and constructed in any manner suitable for enabling it to be inserted into tube D or withdrawn therefrom. The upper end of the rod is provided with a projection or enlargement, *k*, arranged, when the actuating-rod and forcing-piston are being withdrawn, to strike against the upper end of pipe L or a suitable stop connected to the forcing-piston K or to the tubular portion of the actuating-rod I.

As the forcing-piston K and the suction-piston J together move up and down during the operation of pumping, the rod N is stationary with the valve P; but when the suction-piston is raised up and withdrawn from the pump by lifting the actuating-rod I the knob or enlargement of rod I meets the upper end of pipe L, or the stop already mentioned, and is also drawn up and out of the pump-tubes and carries with it the drop-valve P. The forcing-cylinder is also elevated at the same time. Likewise the drop-valve P and the rod N will accompany said pistons and forcing-cylinder, and when the suction-piston and the forcing-cylinder are to be reinserted into the cylinder D the drop-valve is in position for insertion, and is to be first inserted into said cylinder or tube D, and will then be held suspended from the rod N. After the drop-valve is inserted into said cylinder D, the piston J and the forcing-cylinder are successively inserted into cylinder D, and when in working position the drop-valve P will have descended and have reached its seat and be resting thereon in working position.

This improvement in the mode of suspending the drop-valve and of carrying it to its seat may be advantageously employed in single-acting or double-acting pumps. Thus, for example, in single-acting or lifting pumps the forcing-cylinder F and its piston K may be dispensed with. In such event the pipe M may be dispensed with, and the pipe L be, when desired, one with the pipe I of the actuating-rod, or be connected at top to the said rod in any suitable manner.

The head or enlargement *k* of the rod N will engage a suitable stop on the inner portion of said tube or pipe L, or equivalent part of the pump. Thus the drop-valve can be withdrawn from the tube or cylinder D, or reinserted therein along with piston J, in a manner similar to that where two pistons are employed. In any event, whether the pump be single or double acting, the rod N will of course be long enough to enable the piston or pistons to operate in the pump at their proper places and the drop-valve to be in proper position on its seat.

A preferred description of the drop-valve to be used in connection with said rod N, whether the pump has one or two pistons, is as follows: The drop-valve consists of annular portion *m*. This portion *m* is suitably connected to the rod N, preferably, as shown, by an arch, *w*, the lower respective ends of this arch being connected to the annular portions *m* at respectively opposite sides of the latter, and the rod N being connected to the central upper portion of said arch by being screwed thereto or otherwise suitably secured. The periphery of this portion *m* is provided at its upper edge with flange projections or lugs *n*, and at its lower edge with a flange or projections or lugs, *n'*. Between the upper flange or projections, *n*, and the lower flange or projections, *n'*, is located a spring, *p*, preferably annular, as shown, and surrounding the annular portion *m*. The diameter of this annular spring is, when left free and to itself, greater than the diameter of the tube or cylinder D, so that when the spring with the drop-valve is inserted in the tube or cylinder D the spring *p* is compressed, and its elastic pressure will (after the valve has been dropped onto its seat) hold said valve down in position on said seat. The annular portion *m* may rest upon a suitable valve-seat of any desired shape. When the seat is what is known as a "sand" or "raised" seat, the valve is provided with three legs, *q*, which rest on a suitable offset—as, for example, *r*, suitably connected to tube or cylinder D. These legs *q* thus support annular portion *m* at a proper distance above the raised valve-seat S. In the annular portion *m* a suitable clapper or flap or other valve, *t*, is located in any suitable manner and at any suitable point. A preferred form of valve is a clapper-valve, and this is preferably connected, as shown, to the bottom of the annular portion *m*, and rests directly on the valve-seat S. Should it be found that the clapper falls too low below its seat while the drop-valve is being carried to place in the tube or cylinder D, a hook, *v*, may be provided whose shank is connected to the clapper, and whose hooked end rests upon the annular portion *m* or an equivalent projection of the valve.

A novel and useful description of seat for the drop-valve consists of a bushing, 1, preferably of brass or other non-corrosive material, screwed into the bottom of the tube or cylinder D. This bushing is preferably provided with a bottom flange, *u*, having its outer periphery formed in straight sides. Such a flange affords a convenient means whereby a wrench may be applied to screw the bushing into or out from the tube or cylinder D; but the flange can be dispensed with and the bushing screwed into or out of said cylinder or tube by other means. This bushing extends above the offset *r* of the tube or cylinder D, and thus a sand-chamber is formed on the said

offset and between the outer periphery of the bushing and the interior surface of the cylinder. Such a sand-chamber is exceedingly useful in allowing any sand which comes up through the valve to flow down into said chamber and away from and below the face of said valve. This bushing is also advantageous, in that it does away with all loose or packing joints and can be screwed metal to metal. Furthermore, it can be readily inserted to place or withdrawn therefrom, inasmuch as it can be screwed into the cylinder or tube D from the outside.

While the various features of my invention are preferably employed together, one or more of them may be employed without the remainder. One or more of said features may be employed, so far as applicable, in connection with pumps or portions of pumps other than those herein specifically described.

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

1. In a lift-out and drop valve, the combination of annular portion *m*, and annular spring *p*, and devices for holding said spring in position, substantially as set forth.

2. In a drop-valve, the combination of annular portion *m*, and flanges or projections *n n'*, and annular spring *p*, and the valve proper, substantially as set forth.

3. A drop-valve having annular portion *m*, and flanges or projections *n n'*, and annular spring *p*, located between the said projections, substantially as set forth.

4. In a drop-valve, the combination of annular portion *m*, and flanges or projections *n n'*, and annular spring *p*, and valve proper, and legs *q*, connected to the annular portion, substantially as set forth.

5. In a drop-valve, the combination of annular portion *m*, and flanges or projections *n n'*, and annular spring *p*, and valve proper, and leg *q*, connected to the annular portion, and arch *w*, substantially as set forth.

6. The combination of tube or cylinder D, bushing having raised valve-seat I, forming an annular sand-chamber, and drop-valve having annular portion *m*, and flanges or projections *n n'*, and annular spring *p*, and valve proper, and legs *q*, connected to the annular portion, all substantially as and for the purposes specified.

BENJAMIN C. VANDUZEN.

Attest:

JNO. W. STREHLI,

O. M. HILL.