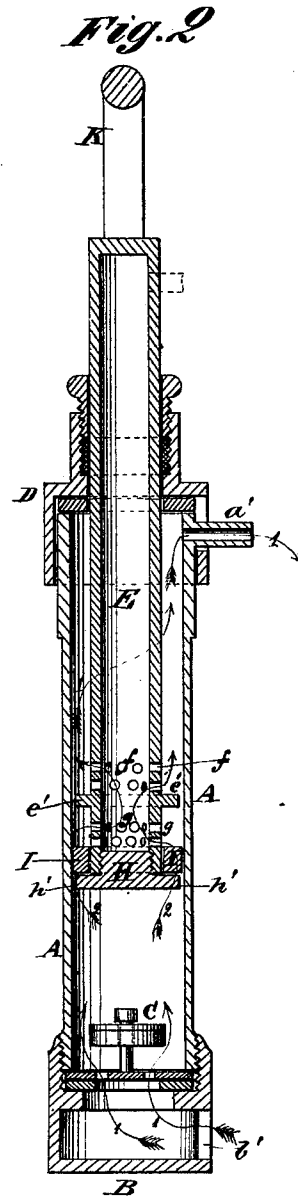
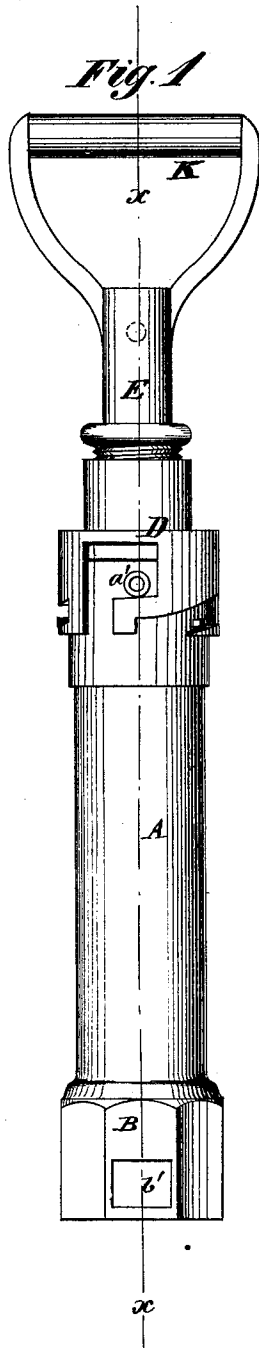


N. MALMQUIST.
PUMP.

No. 176,330.

Patented April 18, 1876.



Witnesses:

R. Brown
C. W. Johnson

Inventor:

Neil Malmquist

UNITED STATES PATENT OFFICE,

NEIL MALMQUIST, OF BROOKLYN, NEW YORK, ASSIGNOR TO W. AND B. DOUGLAS, OF MIDDLETOWN, CONNECTICUT.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **176,330**, dated April 18, 1876; application filed November 13, 1875.

To all whom it may concern:

Be it known that I, NEIL MALMQUIST, of the city of Brooklyn, in the county of Kings and State of New York, have invented an Improved Pump, of which the following is a specification:

My invention has for its object to produce a house or garden pump of such construction as to effect the uninterrupted flow or constant discharge of a double-action pump, while maintaining the singly-acting suction, simplicity of parts, and convenience of compass, of an ordinary single-action pump.

The invention consists in combining a doubly-acting discharge with a singly-acting supply or suction, so as to effect at the same time the functions of air-vessel, piston-rod, and piston in the following manner: The supply is effected, on the upward stroke of the piston, by means of an ordinary foot-valve. The discharge is effected on the upward, as well as on the downward, stroke, and is thus double-acting by means of the piston packing-ring, which, sliding on the piston a certain distance, limited by flanges, serves as a valve to keep up communication between the lower and the upper side of the piston on the downward stroke of the latter. The piston-rod is hollow, and ought to be (when measured outside) of one-half of the capacity of the pump-barrel, and the communication between the upper and lower side of the piston is effected through two openings or sets of holes, one set being above the upper flange on the piston and the other set below the same a distance corresponding to the width of the sliding packing-ring. On the downward stroke (the foot-valve being then closed and the hollow piston-rod being filled with water or other fluid, and, therefore, acting as a solid) a volume of fluid equal to the capacity of the piston-rod or of one-half of that of the pump-barrel is thus discharged, the other one-half of the volume remaining above the piston in the annular space surrounding the piston-rod. On the upward stroke this remaining quantity, or one-half of the capacity of the barrel, is discharged and the entire pump-barrel refilled. The pump has thus a single-acting suction

and a double-acting discharge, the latter being equal, at each stroke, to one-half, or thereabout, of the capacity of the pump-barrel. The hollow piston acts as an air-vessel to the counter-pressure of the discharge.

In the accompanying drawing, Figure 1 represents a side elevation of a pump constructed according to my present invention. Fig. 2 is a vertical section of the same, taken through the line *xx* of Fig. 1.

Similar letters of reference indicate like parts.

A is the pump-barrel. B is the foot-valve chamber, screwed on or otherwise secured to the lower end of the pump-barrel, at which place is interposed and packed in the usual manner a perforated disk as a valve-seat for the foot-valve C. *b'* is the inlet to the pump through the chamber B. *a'* is the outlet, placed at the upper end of the barrel A. D is the stuffing-box for the piston-rod, and is packed and secured to the upper end of the pump-barrel by a bayonet-catch, as shown in the drawing, or in any other suitable manner. E is the piston-rod, which consists of a hollow tube, provided at a distance from its lower end with a surrounding flange, *e'*. Above the flange *e'* the tube E is provided with openings or perforations *f*. Below the flange *e'*, at a distance corresponding to the width of the packing-ring, are other perforations *g*. These openings *g* and *f* constitute the passage of communication between the lower and upper sides of the piston on its downward stroke. H is a plug, screwed to the lower end of the piston-rod E, and provided with a flange, *h'*, constituting the lower flange of the piston. I is the packing-ring for the piston surrounding the tube E, and interposed between the flanges *e'* and *h'*. The ring I is of the same outside diameter as the inside diameter of the barrel A, and of an inside diameter a trifle larger than the outside diameter of the tube E, so as to allow of its sliding freely on the latter from one to the other of the flanges *e'* *h'*. The ring I, playing between the said flanges *e'* *h'*, serves as the valve for the communication between the upper and the lower side of the piston by means of the valve open

ings or passages *g* and *f*. To the piston-rod is attached a handle, *K*, for operating the piston.

The drawing represents the valves and piston in position for an upward stroke. The ring *I* rests on the lower flange *h'*, whereby communication through the tube *E*, between the upper and the lower side of the piston, is stopped. The contents of the annular space above (being one half of the capacity of the barrel *A*) are discharged through the outlet *a'*. The foot-valve *C* is open and supply enters the barrel from the inlet *b'*. The arrows marked *1* indicate the current as just described.

On the downward stroke the ring *I* rests against the upper flange *e'*. The foot-valve *C* is closed. The contents displaced from the barrel by the descending piston rod or tube *E* are forced to the outlet *a'* by way of the openings *g e'* and hollow tube *E*, and another volume discharged equal to the half of the capacity of the pump-barrel *A*, and so on, continuously.

Should ever occasion require, an outlet may be made at *L* in the upper end of the hollow piston-rod and the outlet *a'* closed.

I disclaim, distinctly, the hollow piston-rod, as also the combination of the sliding ring or sleeve *I*, with the flanges *h' e'* and apertures *g f*; but

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

For effecting, in a house or garden pump, the functions of double-action, air-vessel, piston-rod, and piston, the combination with the hollow piston-rod *E* (having an area of cross-section equal to one-half of that of the pump-cylinder) of the sleeve *I* sliding to open and close connection with openings *f g* formed directly on the said piston-rod proper *E*, and with the foot-valve *C*, substantially as specified.

NEIL MALMQUIST.

Witnesses:

C. WM. JOHNSON,
R. FOLSOM.