W. W. Virdin,

Pump Lift.

No. 39,974. Patented Sep. 15, 1863.

Fig. 1

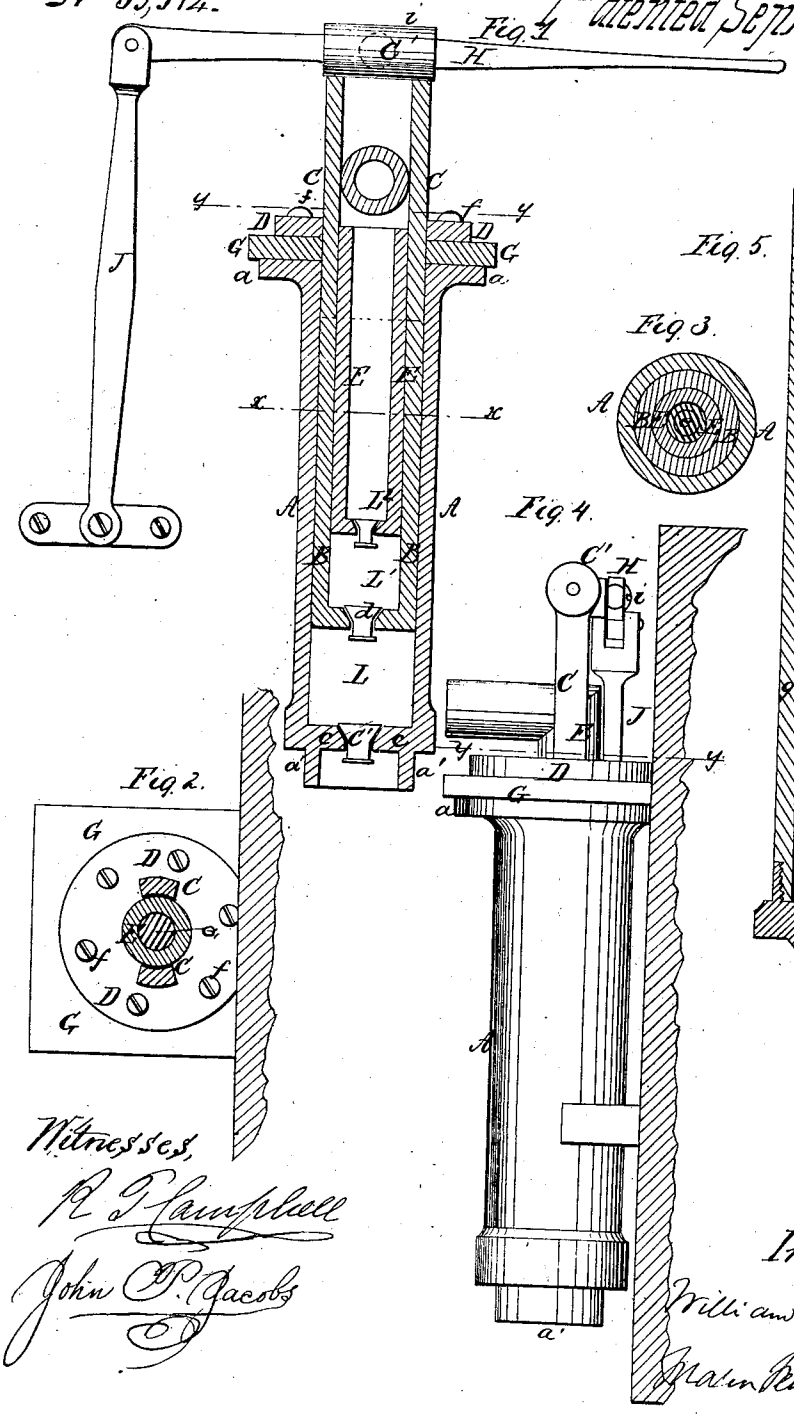
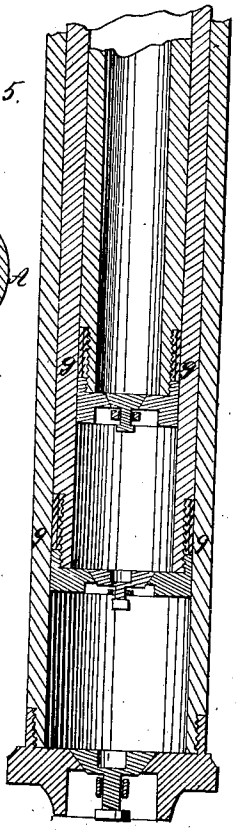


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.



Witnesses,

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UNITED STATES PATENT OFFICE.

WILLIAM W. VIRDIN, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **39,974**, dated September 15, 1863.

To all whom it may concern:

Be it known that I, WILLIAM W. VIRDIN, of Baltimore, in the county of Baltimore and State of Maryland, have invented a new and Improved Pump; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical diametrical section through the improved pump. Fig. 2 is a section through the pump, taken in the horizontal plane indicated by red line *y y* in Fig. 1. Fig. 3 is a cross-section taken at the point indicated by red line *x x* in Fig. 1. Fig. 4 is a side elevation of the pump. Fig. 5 is an enlarged vertical section of the three cylinders.

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

The object of this invention is to obtain a forcing-pump which is suitably adapted to the raising of water, pumping air, oil, &c., a pump which will answer all the requirements of such a machine, and which will be compact, simple, and not liable to get out of order.

The nature of my invention consists in a "single-barrel" force-pump, constructed in such a manner as to furnish an uninterrupted stream of water, using for this purpose only a reciprocating valve-cylinder in conjunction with a stationary valve-pipe, both being arranged within the single barrel or casing of the pump, and operating as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will proceed to describe its construction and operation.

A represents the cylindrical barrel of the pump, which is smoothly bored out and cast with an enlarged flange, *a*, on its upper end, and a reduced cylindrical neck, *a'*, on its lower end, to which latter a pipe may be connected leading to a reservoir. Within this barrel A, and at its lower end, is a valve-seat, *c*, adapted to receive the conical valve *c'*, which opens upward and admits water into the pump-barrel.

B represents a cylinder which is furnished at its lower end with a valve, *d*, opening upward for admitting water from the pump-barrel A into the cylinder B. This cylinder B is not as long as the pump-barrel, and it terminates at its upper end in two parallel arms, C C, which project some distance through the pump head or cap D, and are connected together at their upper ends by a cross-head, C'. Cylinder B is fitted tightly, but allowed to work freely within the pump-barrel, forming within this barrel a reduced chamber for receiving all the water which is drawn into the pump below it, as will be hereinafter described.

Within the movable piston-cylinder B another cylinder, E, still smaller than the pump-barrel, is arranged, which is also furnished with a valve, *e*, in its lower end, opening upward. This latter cylinder or pipe E is snugly fitted within the bore of the movable cylinder, and, not being as long as the pump-barrel A, a space is left between the lower end of this pipe and the lower end of the pump-barrel, which space determines the length of stroke of the cylinder B, and this may be greater or less, according to circumstances. The upper end of pipe E is provided with a nozzle, to which may be connected hose or other pipes for conducting water wherever it may be desired. This pipe E is rigidly fixed at its upper end to the pump-barrel or to the bracket G, to which the pump-barrel is connected, as shown in Figs. 1, 2, and 3 of the drawings, by means of bolts *f f*, which pass through a collar projection, D, cast or otherwise formed around the tube. The lever or pump-handle H is pivoted at *i* to the cross-head C' of the arms C C, and again at one end to the upper end of the vibrating arm J. This is one means for giving a vertical or rather a rectilinear movement to the cylinder B; but I do not confine myself to this plan, as any other may be used which is found most convenient.

The operation of my invention is as follows: When the cylinder B is raised or makes its upward stroke, the valve *d* is closed, and water rushes through the valve-opening in the bottom of the pump-barrel and fills the large chamber left below the cylinder B. Then on the downstroke of this cylinder B the valve *c'* will be closed and valves *d* and *e* will be allowed to open. The water is now forced from the chamber of greatest diameter into the contracted chamber of the cylinder B, which being too small to contain all of it, the surplus water escapes through the valve *e* into the eduction-pipe E. The succeeding upstroke of the cylinder B draws water into the cylinder of greatest diameter again, and at the same time forces all the water which it contains into the

cylinder E, of least diameter. This fills the eduction-pipe E, and the next downstroke of the cylinder B forces the water contained in the pump-barrel into its own chamber and also into the pipe E again, so that I obtain a constant and uninterrupted flow of water from the eduction-pipe, by virtue of the gradually reduced chambers into which the water is continually being forced by the reciprocating or double-acting valvular cylinder B. My pump is thus provided with three containing-chambers, L L′ L^2, as clearly shown in Figs. 1 and 5, the chamber L being represented in the figures as about double the capacity of the chamber L′, and the chamber L′ about double the capacity of the chamber L^2, so that by the reciprocating movement of the cylinder B, as above described, the fluid to be "pumped" will be constantly moved forward with an equable or nearly equable flow, whether the stroke of the cylinder B be up or down. The valves may be ground to their seats, or spring-packing may be used to make them fit thereto with precision, and my pump is equally well adapted to pump liquids, such as water, oil, and the like, or air and gas. I would here state, however, that I do not mean to confine myself to the relative capacities of the containing-chambers L L′ L^2, above set forth, as such capacities may be varied in a greater or less degree and still produce an equable flow of the liquid being pumped, and especially will this regular or equal flow be secured when an air chamber is applied in any of the ordinary practical modes to the upper part of the pump.

In practice it will be found necessary to pack the cylinders B and E, especially so when the machine is used for pumping air. I have shown in the sectional view, Fig. 5, these cylinders packed as I propose to have them in practice. The packing *g g* may be made of steel rings, split and compressed around the lower reduced circumference of the cylinders, so that they will expand and form a durable tight joint, or any other more suitable packing can be used.

It is important that the outer cylinder, A, in my pump should be stationary, and that the inner cylinder, E, should also be stationary, the intermediate cylinder, B, only being movable. I have, therefore, secured the cylinders A E to a stationary ledge or bracket, G, and connected the reciprocating cylinder B to the lever H by means of two parallel rods, C C, which are fixed rigidly to the cylinder at their lower ends and pivoted to lever H at their upper ends. Said rods are passed through the plate G and also through the flange or cap D, which connects the discharge-cylinder to this bracket or plate G. Thus it will be seen that the pump with three valved cylinders can be perfectly operated by moving only one cylinder, and this one being the double-acting intermediate cylinder, B.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The intermediate moving valved chamber, B, constructed, arranged, and operating substantially as described, in combination with the stationary valved chamber E, and the valved receiving outer stationary chamber, A, all adapted to the end stated, and substantially as specified.

2. The outer stationary valved cylinder, A, stationary, innermost, discharging-cylinder E, in combination with the intermediate valved cylinder, B, and connecting arms C C, the latter passing directly through the central plate, G, and cap-plate D, the whole constructed and operating substantially as described.

3. The manner of securing the three valved cylinders A and E together at their upper ends—viz., by means of the flanges *a f* and plate G—substantially as described.

W. W. VIRDIN.

Witnesses:

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