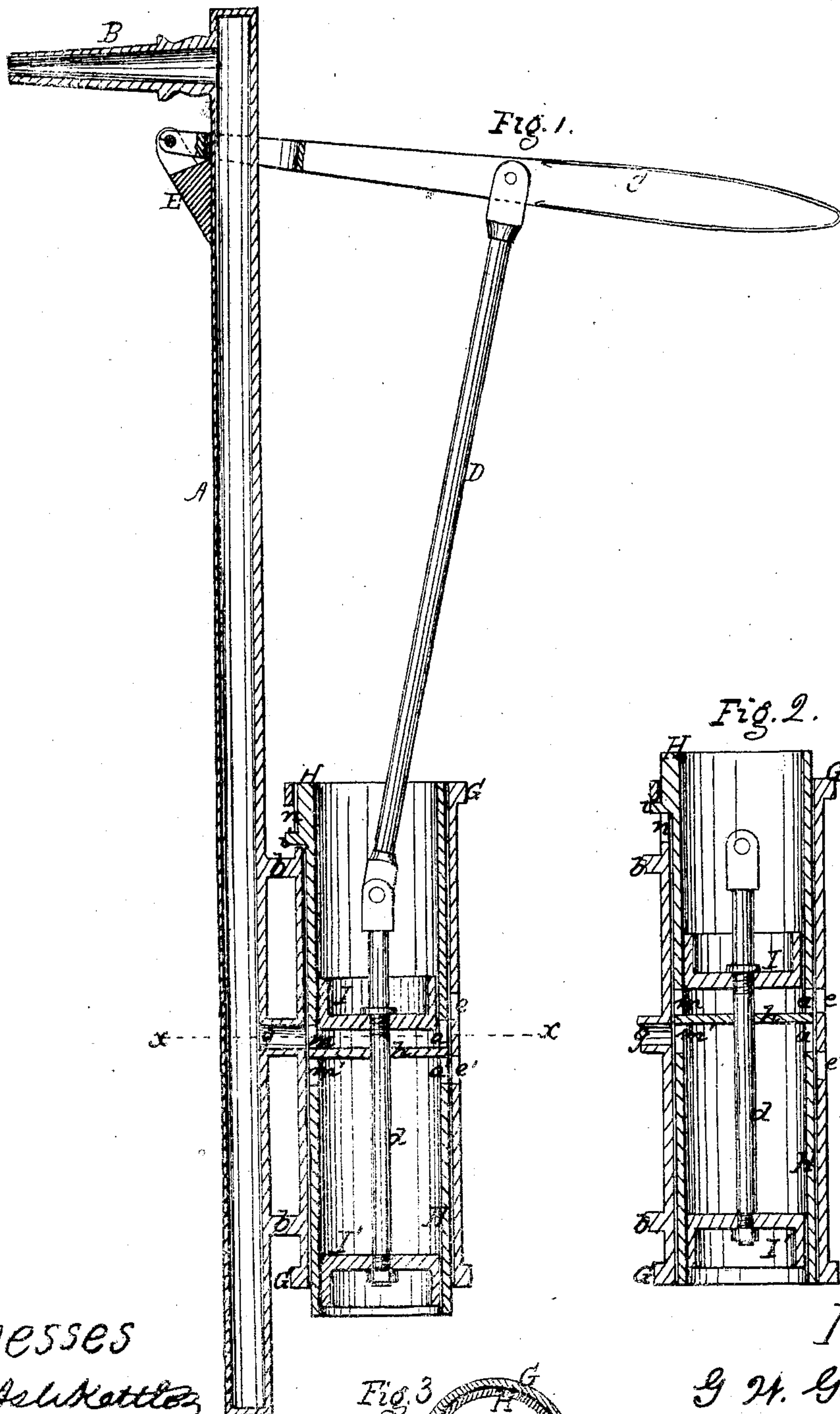


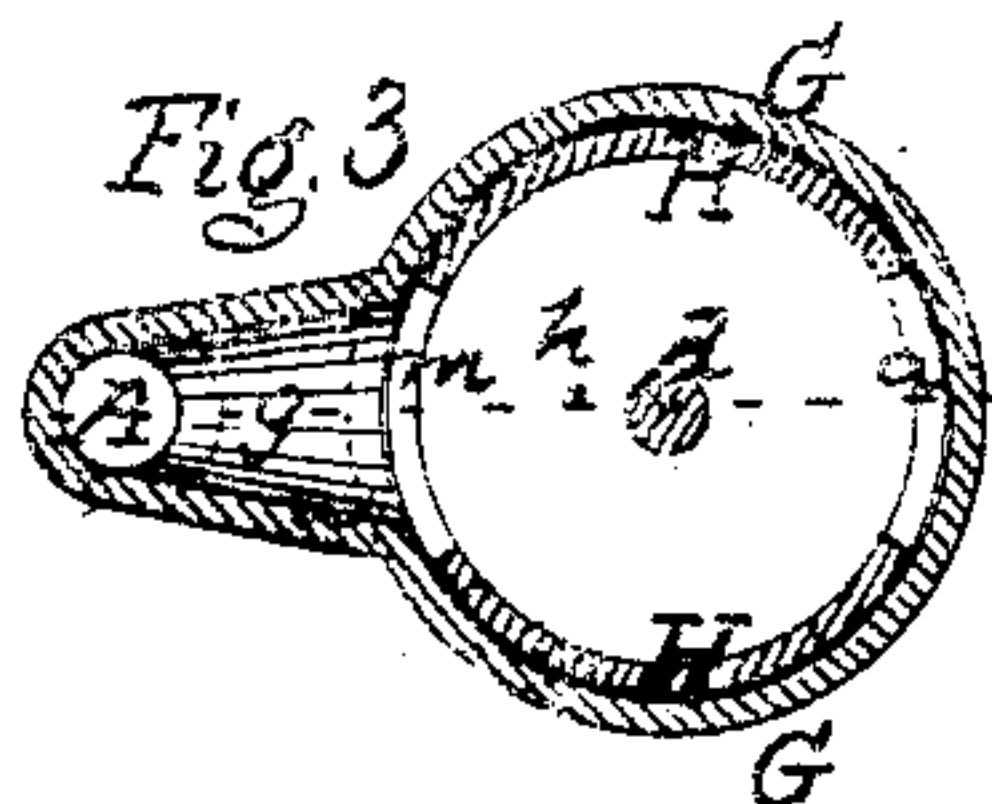
# Gardner & Higgins. Pump.

N<sup>o</sup> 76072

Patented Mar. 31, 1868



Witnesses  
W. C. Ashkett  
Jm A Morgan



Inventors  
G H. Gardner  
Oliver Higgins  
per Murray &  
attorneys

# United States Patent Office.

G. W. GARDNER AND OLIVER HIGGINS, OF NAPOLEON, OHIO.

*Letters Patent No. 76,072, dated March 31, 1868.*

## IMPROVEMENT IN PUMPS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that we, G. W. GARDNER and OLIVER HIGGINS, of Napoleon, in the county of Henry, and State of Ohio, have invented a new and improved Pump; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional elevation of our improved pump, the section being taken through the line *y y*, fig. 3.

Figure 2 is a similar section of the pump-barrel, showing the internal cylinder at its second position.

Figure 3 is a cross-section taken through the line *x x*, fig. 1.

Similar letters of reference indicate corresponding parts.

The object of this invention is to produce a pump which shall draw and force water or other liquids without the use of valves or the disadvantages attending the use of valves.

The invention consists of the parts, and arrangement thereof, as set forth in the following.

In the accompanying plate of drawings, *G* is the external cylinder or barrel common to all pumps. *H* is an internal cylinder, working with finished contact within the external cylinder. The pump-rod and its connections are shown at *D*, *C*, and *E*; the tube *A* serving as the fulcrum-post for the lever *C*. The internal cylinder is permitted a short stroke, which is sufficient to bring its lateral openings, *a a'* and *m m'*, into coincidence with the lateral openings *e e'* of the barrel *G*, or the connection, *g*, of the tube *A*. The stroke of this cylinder is limited by the travel of the stud or projection, *i*, within its slot, *n*, of the barrel *G*, as shown, and it is by the stroke of this cylinder that the openings of the barrel are closed and opened at the proper time, and the office of valves performed. The cylinder *H* is divided by the diaphragm *h* separating the openings *m e* from the openings *m' e'*, as shown. Through this diaphragm a plunger-rod, *d*, works with smooth water-tight contact, and connects the pistons *I I'* rigidly. The pistons *I* are made to fit with air-tight friction within the cylinder *H*, and so fitted that the sum of the friction of the two pistons will be in excess of the friction of the internal cylinder with the external cylinder, whereby, at the initial point of the stroke, the cylinder will be actuated to the extent of its stroke, which will open or close the upper or lower openings, as the case may be. At figs. 1 and 2 this will be specifically explained. At fig. 1 the pistons have reached nearly to the bottom of their stroke. The piston *I* has expelled the water above the diaphragm through the exit-opening *m*, the admission-opening, *e*, being closed by the cylinder *H* at the first part of the stroke.

When the upper opening, *e*, was closed, and the exit-opening *m* brought to coincide with the passage *g*, the openings *e'* and *a'* in the barrel and internal cylinder respectively were brought to coincide, as shown, and the exit-opening, *m'*, of the lower compartment of the internal cylinder was shut off from communication with the said passage *g*, which serves for both exit-openings *m* and *m'*, as will be obvious. At the return or up stroke, the cylinder *H*, having greater friction with the pistons than with the barrel *G*, will move first, and to the extent of its stroke, which is just sufficient to close the openings, as before stated, and bring the exit-opening *m'* into communication with the passage *g*, whereby the water, which was drawn into the lower compartment of the internal cylinder, will be expelled into the tube *A* and out at the discharge-nozzle *B* by the piston *I'*, the piston *I* drawing in the water into the upper compartment as the openings *e* and *a* will have been brought into coincidence and the exit-opening *m* shut off from the passage *g*. The parts *b* are simply for connecting the barrel with the tube *A*, and are solid and cast on to the said barrel.

A similar pump may be placed on the opposite side of the tube *A*, and the lever *C* prolonged and connected in a manner similar to that shown, whereby a double action will result.

The invention is simple and durable, and, from the absence of valves or other parts liable to become deranged, can be employed for submerged pumps, where the same is not easily accessible, with decided advantage.

We claim as new, and desire to secure by Letters Patent—

1. The internal movable cylinder *H*, having diaphragm *h* and openings *m m' a a'*, in combination with the pistons *I I'* and passage *g*, all as and for the purpose set forth.



2. The tube-post A, in combination with the internal movable cylinder H, lever C, barrel G, pump-rod D, and pistons I I', as and for the purpose set forth.

G. W. GARDNER,  
OLIVER HIGGINS.

Witnesses:

A. H. TYLER,  
J. H. HALLER.