

H. T. DRAIN.  
Double-Acting Pump.

No. 215,107.

Patented May 6, 1879.

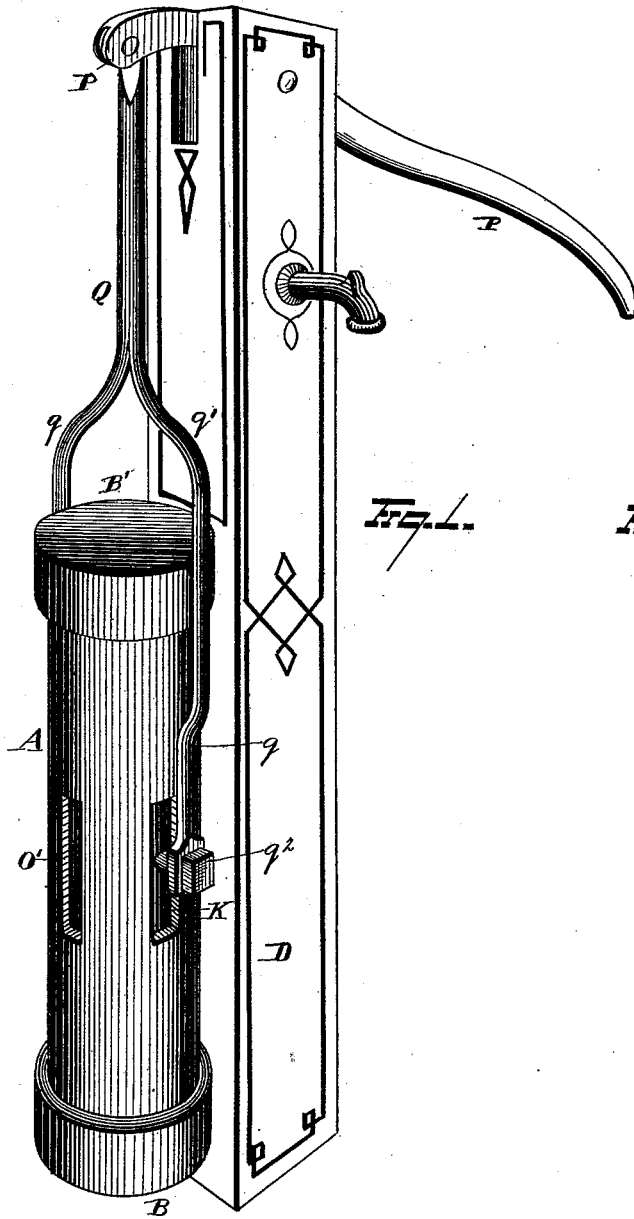


Fig. 1.

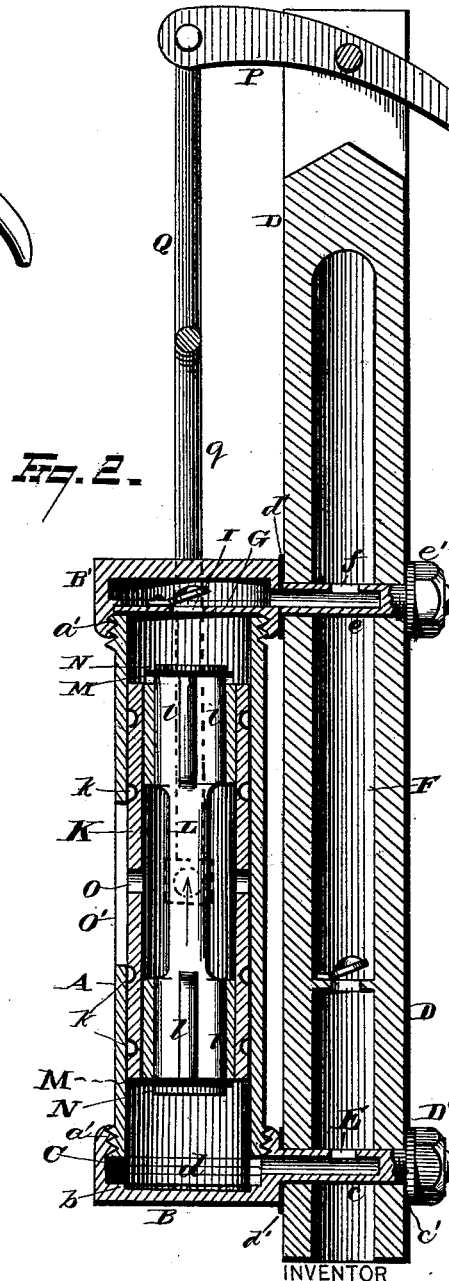


Fig. 2.

WITNESSES  
E. J. Nottingham  
A. M. Bright.

H. T. Drain.  
By Seagett & Seagett.  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

HENRY T. DRAIN, OF TAMA CITY, IOWA.

## IMPROVEMENT IN DOUBLE-ACTING PUMPS.

Specification forming part of Letters Patent No. **215,107**, dated May 6, 1879; application filed March 26, 1879.

*To all whom it may concern:*

Be it known that I, HENRY T. DRAIN, of Tama City, in the county of Tama and State of Iowa, have invented certain new and useful Improvements in Double-Acting Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in double-acting pumps, the object being to provide a pump of such construction that it may be readily and securely attached to the tubing or pump-stock, and the parts so arranged and connected that access to the valves for cleansing and repairs may be had with little difficulty, and all undue wear on the working parts of the pump ordinarily caused by the accumulation of sand, &c., entirely obviated.

In the accompanying drawings, Figure 1 is a view, in perspective, of my improved pump, and Fig. 2 is a vertical section of the same.

A represents the pump-cylinder, provided with screw-threaded ends *a' a'*, to which are secured the cylinder-heads B B'. The lower cylinder-head, B, is constructed with an annular ledge or seat, *b*, upon which is placed a gasket, C, of leather or other suitable packing material, which serves as a seat for the lower end of the pump-cylinder A when the lower head is secured in place, and thereby packs the joint between such parts in a water-tight manner.

To one side of the cylinder-head B is secured a tube, *c*, the end of which may be screwed into the cylinder-head, or secured thereto in any manner desired. Tube *c* connects with the space *d* in the cylinder-head, while the outer end thereof is made solid and provided with screw-threads *c'*, said tube being of sufficient length to extend through the pump-stock or tubing D, and be secured thereto by a nut, D'.

A washer, *d'*, is preferably placed over the tube *c*, between the cylinder-head and pump-stock, to protect and pack the joint between the tube and cylinder-head, and also serves as a yielding bearing for the pump against the

tubing or pump-stock, and thus allows the fastening-nuts to be screwed up tightly without danger of their being loosened by any jarring action on the pump.

The upper side of tube *c* is provided with a port, E, which registers with the bore F of the tubing, thereby establishing a direct communication between the bore of the tubing and the lower portion of the pump-cylinder.

The upper end of the pump-cylinder is provided with a detachable cylinder-head, B', which is of the same construction as the lower cylinder-head, B, and is attached to the tubing in the same manner.

The tube *e*, secured to the upper cylinder-head, extends through the tubing, and is secured by a nut, *e'*, while the port *f*, formed in the tube, registers with the bore of the tubing.

From the foregoing it will be observed that the pump-cylinder is secured to the tubing by means of the two tubes before explained, which also serve as conduits, establishing a direct communication between the bore or passage-way of the tubing and the upper and lower ends of the pump-cylinder.

Within the upper cylinder-head is placed a plate, G, preferably made of metal, which seats upon the annular ledge, and is held in place by the upper end of the pump-cylinder.

Plate G is provided with a central perforation or opening, over which is placed a weighted flap-valve, I, which latter, as will be observed, closes downwardly. K represents the pump-piston, which consists of a cylinder provided with grooves *k* of any desired number formed in its periphery, within which the water and oil collect and serve as a liquid packing to the piston while in operation. Within the cylindrical piston K is placed a valve-rod, L, the opposite ends of which are furnished with wings *l*, which serve to retain the rod in position and allow of the free passage of water and sand through the spaces intervening between the radial wings *l*. To the opposite ends of the valve-rod L are removably secured the yielding valves M, provided with a rigid supporting-plate, N.

As the valve-rod L slightly exceeds the piston in length, it will be seen that when the upper valve is closed and rests against the upper

end of the piston the lower valve will be open and allow any liquid or sand in the piston to flow into the lower portion of the pump-cylinder. Again, when the piston is on its downstroke the lower valve will be closed and the upper valve opened. Piston K is furnished with any desired number of water-induction ports, O, which register with the elongated openings O' formed in the pump-cylinder, whereby water may flow through the openings in the cylinder and into the pump-piston at any part of the stroke of the pump. P is the pump-handle, which may be made of any preferred form and construction. To the short end of the handle is pivoted the upper end of a connecting-rod, Q, the lower end thereof being provided with branches  $q$   $q'$ , which are attached at their lower ends to the pump-piston by means of screws  $q^2$ .

When the pump-piston is forced downwardly the resistance of the water beneath the piston, together with the vacuum made above the piston, operates to close the lower valve of the piston and allow any water that may enter the piston to flow upwardly past the upper valve and into the upper end of the pump-cylinder.

The upward stroke of the pump-piston operates to close the upper valve and force any water in the upper end of the pump-cylinder upwardly through the check-valve in the upper cylinder-head, and through the tube connecting therewith into the tubing. Thus the pump is made to operate effectively on both its down and up strokes.

The valve in the upper head of the pump-cylinder prevents the return of the water that is forced out of the cylinder on the upstroke of the piston, and, further, when the piston is forced through its downstroke a partial vacuum is formed below the upper valve, which allows the water to be raised by atmospheric pressure into the upper portion of the pump-cylinder, ready to be raised and ejected through the upper valve on the next succeeding upstroke of the piston. The partial vacuum in the upper portion of the cylinder also serves to assist the action of the piston-valves and cause them to work with more promptness and certainty than would be the case if sole reliance were placed on the resistance of the water for actuating the valves.

In the pump-stock I place a downwardly-closing check or flap valve, which serves to prevent the return of the water into the cylinder by the upstroke of the piston, and also to form a partial vacuum in the pump-stock and allow the water to rise therein by the force of atmospheric pressure. The partial vacuum also insures the quick and prompt action of the piston-valves when the piston is forced through its upstroke.

Instead of placing the valve in the pump-stock I may place it in the lower cylinder-head, arranging it to open downwardly, when

it will perform the same office as it does when located in the pump-stock.

It will be observed that the piston is thoroughly cleansed at each stroke, and hence the pump cannot become impaired by reason of the accumulation of sand or grit in the piston or cylinder, as is the case with many pumps of ordinary construction.

My improved pump is of simple construction, and requires but little power for its operation. It is composed of few parts, all of which embody simplicity and small initial cost in manufacture.

It is evident that many slight changes may be made in the construction and arrangement of the several parts of my improved pump without departing from the spirit of my invention—as, for instance, the cylinder-heads may be provided with lugs, and be secured by means of tie-rods, if desired.

The valve in the upper cylinder-head may be a ball check-valve inclosed in a suitable cage.

Again, the valve-rod in the pump-piston may be made in two or more parts, and adapted to be expanded or contracted in length to vary the amount of valve-opening.

Many other changes might be suggested; and hence I would have it understood that I do not limit myself to the exact construction shown and described; but,

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

1. The combination, with a pump-cylinder, of removable cylinder-heads, each provided with water-chambers, and with tubes having closed and screw-threaded outer ends, while the central portions of the tubes are provided with ports, whereby said tubes are adapted to extend through the pump-stock, and serve as bolts to secure the pump-cylinder in place, and also serve to convey water from the cylinder to the pump-stock, substantially as set forth.

2. The combination, with a pump-cylinder, of a removable cylinder-head having a tube connected therewith, the outer end of said tube being closed and screw-threaded, while the central portion of the tube is provided with a port or passage-way, whereby said tube is adapted to secure the pump-cylinder to the tubing or pump-stock, and also serve as a water-conduit to convey water from the pump to the tubing or pump-stock, substantially as set forth.

3. The combination, with a pump-cylinder and removable cylinder-heads provided with water-chambers and means for securing the cylinder to the pump-stock, said pump-cylinder provided with elongated openings in the sides thereof, of a hollow pump-piston, constructed with openings which register with the elongated openings in the cylinder, and provided with a single reciprocating valve-rod,

having valves attached to the opposite ends thereof, substantially as set forth.

4. The combination, with a pump-cylinder constructed with elongated openings intermediate its ends, of a hollow piston having its ends governed by valves which are secured to opposite ends of a single valve-rod, said hollow piston provided with openings (one or more) for the admission of water to the interior of the same, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 14th day of March, 1879.

HENRY T. DRAIN.

Witnesses:

G. D. SHERMAN,  
S. D. CHAPMAN.