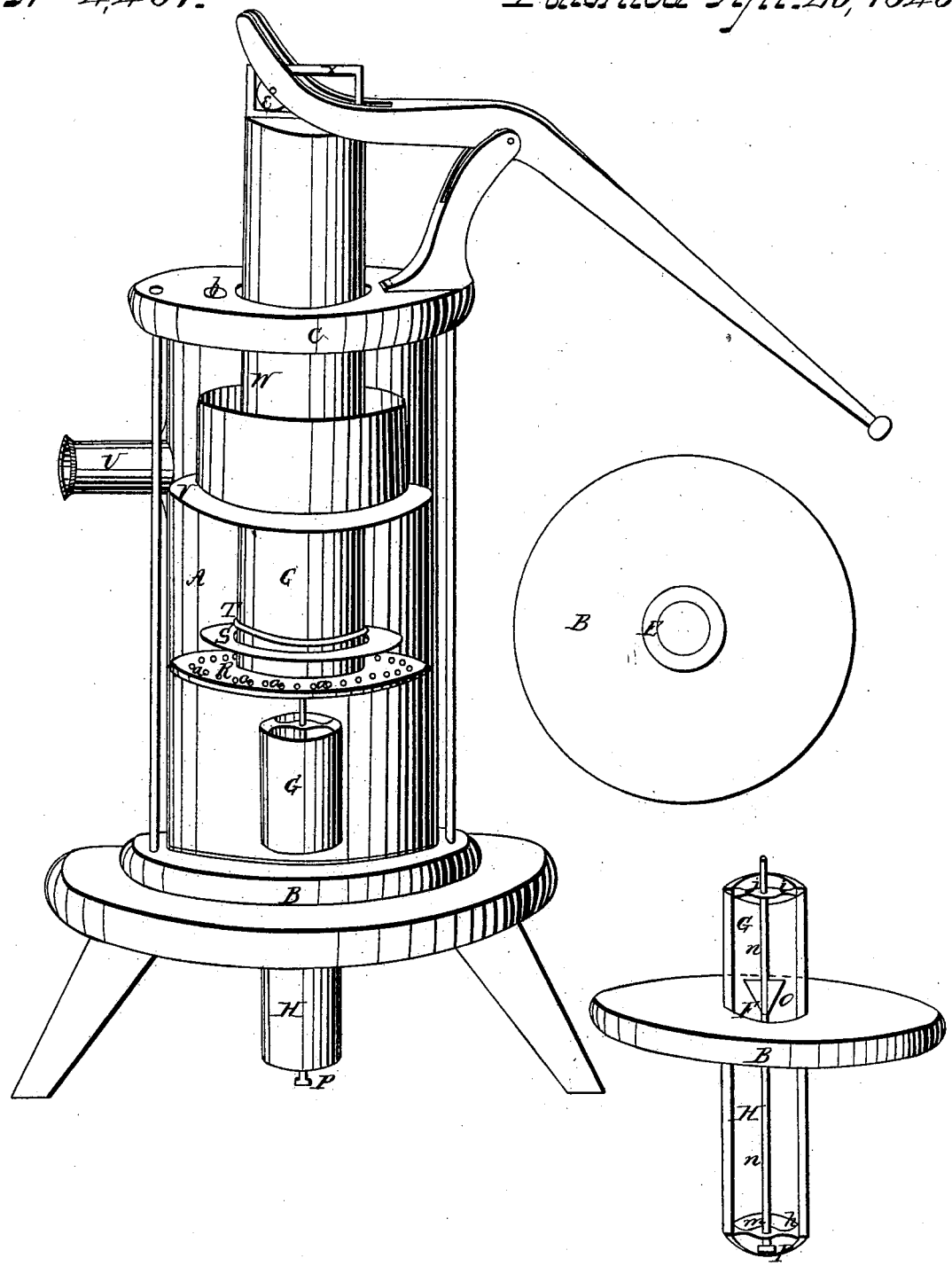
D. G. Colburn,

Pump Lift,

No. 4,467. Patented Apr. 25, 1846.



UNITED STATES PATENT OFFICE.

DAVID G. COLBURN, OF WILMINGTON, VERMONT.

PUMP.

Specification of Letters Patent No. 4,467, dated April 25, 1846.

To all whom it may concern:

Be it known that I, DAVID G. COLBURN, of Wilmington, in the county of Windham and State of Vermont, have invented a new and improved mode of packing the upper valves of atmospheric or suction pumps air-tight with water retained in the body of the pump for the purpose, and that I have further invented a combination of machinery or workmanship, whereby the water so retained may be in the main returned at pleasure to the fountain; and I do hereby declare that the following is a full and exact description of these my inventions, given to enable others skilled in the art to make and use them.

I construct the body of the pump of any of the usual materials, and in the form of a hollow cylinder—lettered A, in the accompanying drawings. The diameter of this cylinder may be to its length as 1 is to 2. The lower end of this cylinder is closed with a plate (marked B, in the drawings) fitted air tight to the edge of the cylinder A—the opposite or upper end of the cylinder, marked C, is closed in the same way; though it is not essential that the cylinder and plate should be fitted to each other air-tight. Through the center of the plate B, a round hole—F—is cut, the perimeter of which is formed like the horizontal section of a hollow cone, with its greatest diameter lying in the plane of the inner surface of the plate B. The mean diameter of this hole may be one fourth the diameter of the cylinder A. This hole forms the bed of the lower valve marked O. On the inner surface of the plate B, the hole F is surrounded by a tube G, the length of which may be one fourth the height of the cylinder A, and its diameter may be one inch greater than the mean diameter of the hole it incloses. This tube, when in position, stands vertically around the hole F, its lower end resting on the inner surface of the plate B, as represented in the drawings—and I secure the tube in this position by making it a part of the plate B. From the outer or lower surface of the plate B and forming a part of that plate, another tube, H, surrounding the hole before named, projects downward at right angles with the plate B—the length of this tube may be one half the length of the cylinder A, and its diameter equal to the smallest diameter of the hole F that it incloses. Across the upper end of the tube G, and in the line of its diameter, is a bar—marked *i*—secured to the tube—in the center of this bar is a hole—marked *j*—whose diameter may be $\frac{1}{24}$ the diameter of the cylinder A,—and there is a similar bar with a like hole in its center, across the end of the lower tube H′ and in the line of its diameter—this bar and hole are represented at *k* and *m*, in the drawings. A metallic rod—marked *n*—of about $\frac{5}{6}$ the length of the cylinder A, passes from one of these bars to the other, through the hole in each, as represented in the drawings. Attached to this rod and within the tube G, is a metallic valve—marked *o*—in the form of an inverted cone, which acts in the hole or bed F—prepared for it as before described. Neither this valve or its bed should be packed—nor is it intended that they should be fitted to each other water tight. At the lower end of the rod *n*, is a nut—marked P—to prevent the valve O, rising too high by force of the water when the pump is in operation. To the lower end of the tube H, the pipe is secured that communicates with the fountain.

The piston of the pump—marked Q—is a cylindrical tube, perfectly tight at the top and open at the bottom—its length may be from half an inch to an inch longer than the cylinder A and the diameter of its bore should be large enough to receive freely the tube C. When the piston is at its lowest point of depression at the bottom of the cylinder A—and when the piston is depressed to this point the space between the outer surface of the tube G and the inner surface of the piston Q should be one fourth of an inch. To the lower end of the piston Q, is attached, by its being made a part of the piston, a circular metallic plate—marked R—the surface of which forms right angles with the piston—this plate should be of sufficient thickness to hold the plate in a horizontal position when the pump is in operation—this plate should fill the body of the cylinder A, in which it is to move, still it is not necessary, nor is it intended by me that this plate should be fitted to the inner surface of the cylinder A, perfectly water tight. In the plate R, is a number of holes marked *a*, *a*, *a* sufficient to allow the water to press through freely as the plate is forced down through the subjacent water by the descent of the piston. Above the plate R, is another metallic plate—marked S—called the clapper, and of a form similar to the

form of the plate R. The plate S has a hole in the center, as represented in the drawing, through which the piston Q, is passed. This hole is large enough to allow the clapper S, to play freely between the plate R, and a metallic collar—marked T—secured to the piston Q, around its outer surface about one half inch from the plate R. This clapper S, should be large enough to cover all the holes in the plate R, when the two are in contact. The plates R, and S, taken together constitute the upper valve of the pump. The spout—marked U—may be from 2 to 4 inches from the top of the cylinder A, and the diameter of its bore should be about $\frac{1}{8}$ the length of the cylinder.

On a level with the lowest line through the bore of the spout, a circular metallic plate, marked V, large enough to fill the cylinder A is placed horizontally and permanently secured to the inner surface of the cylinder A. Through a hole in the center of this plate V the piston Q passes, and the diameter of this hole may exceed that of the piston Q by about one inch as represented in the drawings. Fastened on the perimeter of this hole by its being made part of the plate V, stands a metallic tube-marked W and rises vertically about one inch above the bore of the spout U. The object of the plate and tube just described, is to direct the upward current of the water, when the pump is in operation, away from the inner end of the bore of the spout, thus securing a more equal flow of water from the spout, the diameter of the tube W should be the same as that of the hole last named. In the plate C, that forms the head of the cylinder A, is a hole, marked *b*, about $\frac{1}{2}$ inch in diameter and immediately over the opening between the tube W and the piston Q, this hole is for the purpose of pouring in water with which to pack the upper valve, when the cylinder A is otherwise empty. The piston may be worked with a lever or crank with the usual fixtures and gearing, but if with a lever, the piston should be made with a rack, marked *x*, on the top in the form of a parallelogram, which rack receives a friction roller, marked *e*, revolving on a pivot in the short arm of the lever as represented in the drawings, whereby the piston may be made to ascend and descend in a straight line.

The mode of the pump's operation is as follows: Suppose the pump in all its parts and appendages to be void of water, and the clapper S resting by its own gravity upon the plate R. A small quantity of water is poured into the cylinder A through the hole *b*, which water falls upon the upper valve (composed of the plates S and R as herein before defined) and packs it air-tight. The working of the pump should commence immediately; as the working progresses all the results ensue that are secured by the action of the common pump and on the same principles. When, however, the working of the pump is suspended, the piston valve being left in the position indicated in the drawing, or at any other point above the top of the tube G where it will be held stationary by the force of the lever, the clapper S falls by its own gravity upon the plate R and the lower valve *o* falls into its bed F, then by the reserved leakage of the two valves, all the water in the cylinder A and all in the tubes G and H and in the pipe is returned to the fountain, except enough to fill the space in the cylinder A between the outer surface of the tube G and that portion of the inner surface of the cylinder A by which the tube G is immediately surrounded. This water is retained, by the tube G being interposed between it and the only possible outlet, the lower valve O. Now when the working of the pump is resumed, and the upper valve S, R, by the descent of the piston Q is plunged into this reserved water, the water passes through the holes *a*, *a*, *a*, &c., in the plate R and packs the valve S, R, air tight, as in the case before described when the water was poured through the hole *b*, and as the working of the pump is continued, the usual results that attend the action of the common pump are secured and on the same principles. But it is often desirable that all the water in the cylinder A and in all of the appendages of the pump should be expelled, this may be done as follows: When the process of pumping is closed, and while there is yet water enough above the piston valve S R to exclude the external air, sink the piston Q to its lowest point of depressions at the bottom of the cylinder A and leave it there. Then the water in the cylinder A will run into the fountain by the force of gravity down to the level of the top of the tube G and the water then in the tubes G and H still continuing to descend by gravity and by its descent forming a vacuum in the upper section of the tube G, the residue of water in the cylinder A by the pressure of the atmosphere on its surface, is forced up between the outside of the tube G and the inner surface of the hollow piston that surrounds it, and falling into the tube G by its own gravity, descends into the fountain by the same means and this process is continued until all the water in the pump and its appendages is discharged, except a thin concentric layer remaining in the space between the outside of the tube G and the inner surface of the piston Q. Should ice form here so that the piston could not be parted from the tube by the power of the lever, it may be melted by hot water poured into the cylinder through the hole *b*, and this water would

do no harm for there is no packing for it to injure.

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

The combination of the tube G, the piston Q and the valves S K and *o* with each other and with the other parts of the machinery described, in the manner herein before specified, for the purpose of raising water and other liquids from a lower to a higher level. And I make no further claim.

DAVID G. COLBURN.

Witnesses:
O. L. SHAFTER,
AMES ROBERTS.