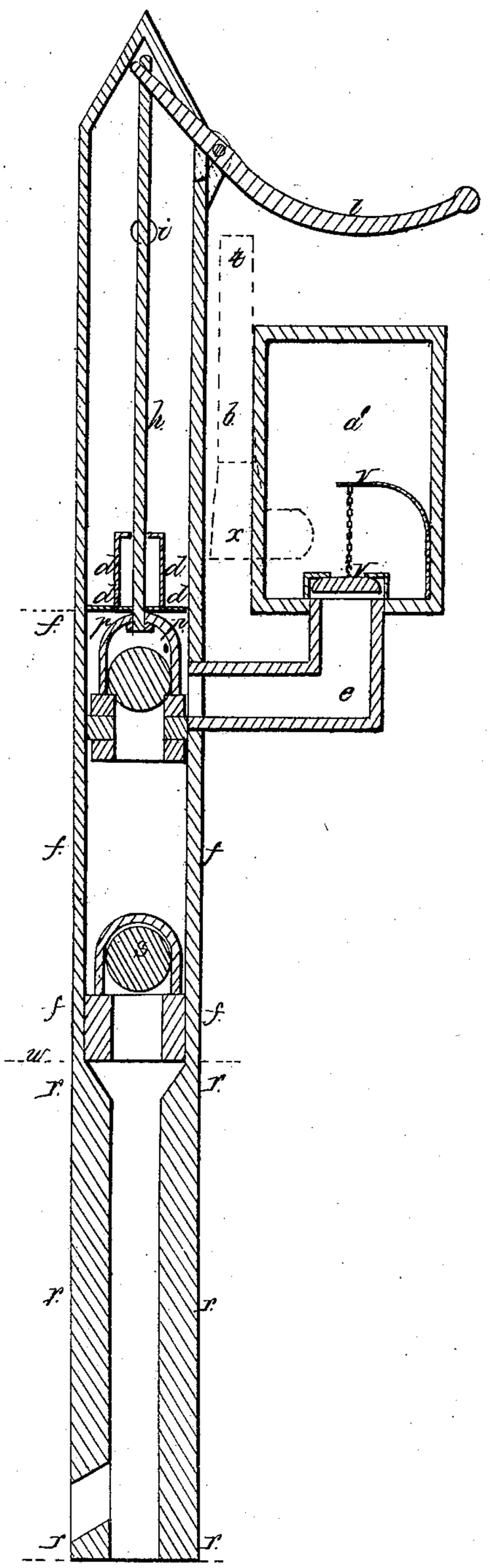
Palmer & Keenorts.

Pump Lift,

No. 22,182. Patented Nov. 30, 1858.



UNITED STATES PATENT OFFICE.

A. L. KEEPORTS AND GEO. PALMER, OF LITTLESTOWN, PENNSYLVANIA.

PUMP.

Specification of Letters Patent No. 22,182, dated November 30, 1858.

To all whom it may concern:

Be it known that we, A. L. KEEPORTS and GEO. PALMER, of Littlestown, Pennsylvania, have invented an Improvement in Pumps, which we call the "Minimum Fountain-Pump;" and we do hereby declare the following to be a full and clear description thereof, reference being had to the annexed drawing, making a part of this specification, in which—

Figure 1 represents the minimum feature and Fig. 2 the fountain feature.

The nature of our invention consists in the combination of the fountain pump with the main stem, and in determining the point which we term the true point at which to place the gain of leverage in operating the pump.

In the construction of our pumps,—say in one of twenty four feet, the place of lower valve will be one third of the depth of the well; but this one third rule does not answer for any other depth of well, this point always varies with the depth of the well, as for example, in a well forty-eight feet deep, this rule fails to keep up, for it will be found that the proper point for the lower valve will be seventeen feet nine inches, instead of sixteen feet, the one third of the depth. Again,—in a well of sixty five feet, the required point will be twenty-three feet, and in a well of ninety feet it will be twenty six feet, four inches. In illustration of the reason of this, we state, that if, the works were placed at an erroneous point *i. e.* at any other, than the point ascertained by rule, the momentum of the water between these points true and erroneous would be lost, *i*, *e*, the gravity of that column embraced between the right and wrong points is, say, sixteen pounds, and the velocity at the rate of two feet per second, then, since the momentum of a body is equal to its weight into its velocity per second, it would therefore of necessity require thirty two pounds more of lever power to raise said erroneously placed quantity of water; but by placing the lower works as stated at the proper point, we raise the column of water with half the power ordinarily required by other pumps. This fact we have established by practical demonstration.

In the arrangement of the air chamber with the main pump, it will be seen, that, one pound of water in the ascension pipe exerts a resistance of four pounds on the forcing piston, because the area of the base of the forcing piston is equal to the area of the ascension pipe multiplied by four; but with four pounds of pressure on the piston, we can raise eight pounds of water to any given point through the ascension pipe, (the velocity of the water in the ascension pipe being eight times the velocity it has in the forcing barrel). Now, if the water were carried directly up the main pipe to the same height, there would be eight pounds of resistance on the piston, at each stroke, but by our arrangement there is but four pounds of resistance at each stroke, and will produce the same quantity of water at the same point in the same time, as though it passed directly up the main pipe.

In the advantages gained by our compound pump, it may be seen that, if the main pipe *b* were placed directly over the piston, the water forced through it, directly from the piston would not accomplish our object, as the increase of friction from the velocity with which it would have to pass, would destroy our gain; but by its passing into the fountain *a*, which is an elastic reservoir, (because of the air contained in it) as the piston is moved up, the water passes through pipe *e*, through spring valve V into reservoir *a*. The valve V is different in its construction from ordinary valves, as it does not rest on its seat when not in use, but is held open by the spring to which it is attached, in its unused state it is an open valve, but, as soon as the water is forced into the reservoir *a*, the weight of the water and the atmospheric pressure closes the valve and as the fluid is forced into the chamber *a* it passes into the ascension pipe *b*, through connecting pipe *x*. Let us suppose the water now in the ascension pipe *b* to be equal to one pound pressure. This will compress the atmosphere until its elasticity becomes equal to one pound pressure on the valve V, which one pound is equal to four pounds on the piston, this four pounds pressure on the piston, together with the pressure of the atmosphere on the water in pipe *b*, is always equal to the eight pounds pressure on the valve half the time when the water is forced up the main pipe. Thus, it will be seen we gain greatly by our combination.

Having thus described our improvement, what we claim as new and desire to secure by Letters Patent, is:

The combination of the main pump *r* with the reservoir *a*, and ascension pipe *b*, elastic spring valve V, the whole arranged in relation to the proportions existing between the valves and pipes operating as described and for the purposes set forth.

A. L. KEEPORTS.
GEORGE PALMER.

Witnesses:
JOHN MCILVAIN,
JACOB H. HOLLEBAUGH.