R. Ramsden,

Force Pump,

No. 28,012, Patented Apr. 24, 1860.

Fig. 1.

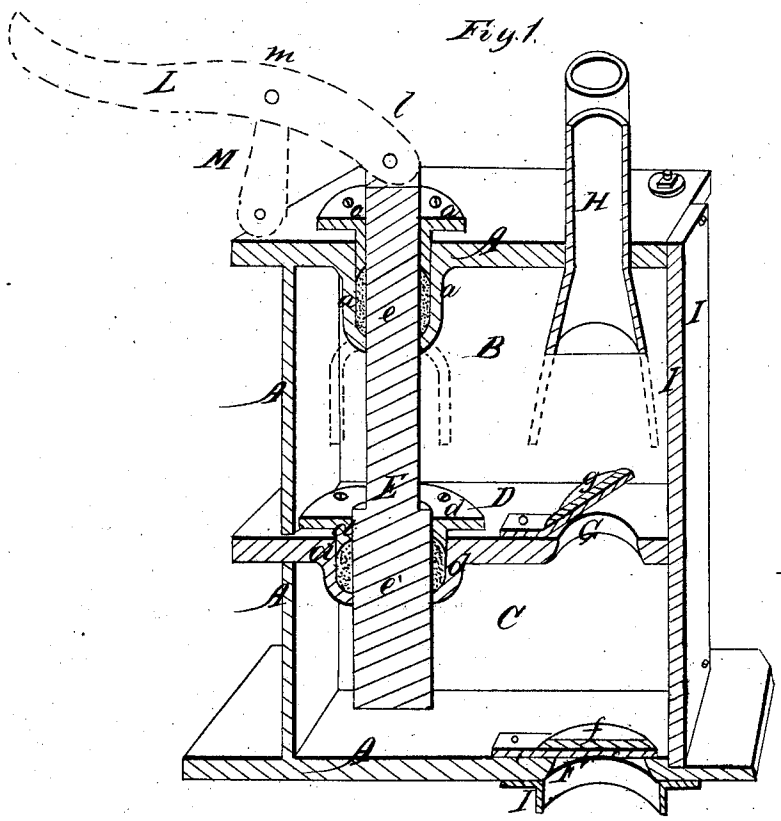


Fig. 2

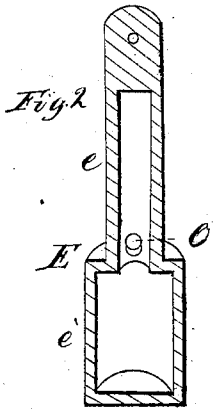


Fig. 3

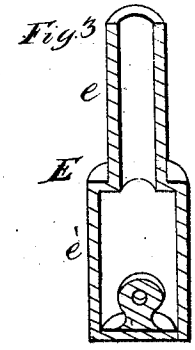
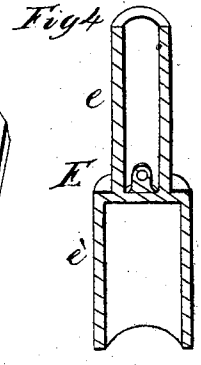


Fig. 4



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT RAMSDEN, OF SOUTH EASTON, PENNSYLVANIA.

PUMP.

Specification of Letters Patent No. 28,012, dated April 24, 1860.

To all whom it may concern:

Be it known that I, ROBERT RAMSDEN, of the borough of South Easton, in the county of Northampton, in the State of Pennsylvania, have invented a new and useful improvement on lift and force pumps, whereby they are rendered double-acting without the necessity of using more than two valves; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a longitudinal vertical bisection of the pump in perspective. Figs. 2, 3 and 4 are sections showing the different methods of constructing the plunger.

The same letters of reference indicate corresponding parts in all the figures.

The nature of my invention consists, in constructing that class of pumps called "plunger pumps," in such a manner that they will discharge water either when the plunger or piston is raised up or pushed down without using more valves than are required by the said class of pumps, which only discharge water on the down stroke of the plunger or piston.

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

A A A A A is a casing or box, to be constructed of any suitable shape, or material, having its interior divided horizontally into two separate water tight compartments or chambers B and C by the division plate D. Through the bottom of the chamber C, there is an opening F, covered by a valve *f*, and an induction pipe I is attached to the under side of the opening F. Through the division plate D, there is an opening G also covered by a valve *g*. An eduction pipe H is attached to the top of the chamber B, said pipe projecting into, and below the top of, the chamber B, the opening of said projecting end of pipe H being made bell mouthed as clearly shown in Fig. 1.

E, is the plunger or piston. It may be described as being formed of two straight cylindrical solids, one of larger diameter than the other as *e'* and *e*, one end of the smaller one *e* being joined to one end of the larger one *e'* so that their axes will be parallel to a straight line common to both; both thus joined together forms the plunger E, having the lower straight cylindrical part *e'* of larger diameter than the upper straight cylindrical part *e*, as plainly shown in all the figures. The end *e'* of the plunger E, passes through the division plate D into the chamber C, its passage being made water tight by means of the stuffing box and packing *d*, *d*, *d*, *d*. The end *e* of the plunger E, passes upward through the top of the chamber B, above the outside, being made long enough for that purpose, and, its passage is made water tight by means of the stuffing box and packing *a*, *a*, *a*, *a*.

The top of the end *e*, of the plunger E, is hinged to the end *l* of the lever L. A piece M is hinged at one end to the top of the chamber B. Its other end acts as fulcrum for the lever L at the point *m*. One part of the chambers B and C contiguous to the valves *f* and *g*, and stuffing box *d*, *d*, *d*, *d*, is closed by a door or separate plate as at J, J, so that said plate can be readily removed, to give access to the chambers B, and C, without disarranging the pipes, or fastening of the pump. The bottom of the stuffing box *a*, *a*, *a*, *a*, is continued around the piston E in the chamber B, as low down as the bell mouthed opening of the eduction pipe H, and they may both be continued nearly to the bottom of the chamber B, provided that, the lower end of the stuffing box *a a a a* be made large enough for the end *e'* of the plunger E to work up in it freely, as plainly shown by the dotted lines in the chamber B, Fig. 1. If the casing A A A A A, and the division plate D be made in separate parts as in this case, then the joints between the plate D and casing A A A A A, are to be made water tight in any suitable manner and the whole secured together by bolts, which in this case pass through, a flange on the top of chamber B and a flange on the bottom of chamber C, as shown at *n*, Fig. 1.

The operation of the pump is as follows: On working the lever L so as to raise the plunger E, the valve *g* closes the opening G and a partial vacuum is formed in the chamber C, the valve *f* is raised, and the water rises through the induction pipe I and opening F, into the chamber C to fill said vacuum. Then, on working the lever L, so as to push down the plunger E, the valve *f*, closes the opening F, the valve *g* is raised and a portion of air is forced from the chamber C through the opening G, into the chamber B. By continuing to raise up, and

push down, the plunger E, the air will be expelled from the chamber C and its place filled with water. Then on pushing down the plunger E water will be forced through the opening G, raising the valve *g* and expelling air from the chamber B through the eduction pipe H, until the water rises in chamber B so as to close the bell mouthed opening of the pipe H. Now if the end *e'* of the plunger E, which operates in both chambers B and C, be made of a diameter to give twice the cubical content of the end *e* of the plunger E, which works in the chamber B only. Then, on pushing down the plunger E, twice as much water will be forced from the chamber C into the chamber B, as there is room made for, in the chamber B by the descent of the end *e'* of the plunger E, out of the chamber B, into, the chamber C because, the end *e* of the plunger E will descend into, the chamber B, as far as the end *e'* descends into the chamber C. Consequently, one half of the water forced from the chamber C on the down stroke of the plunger E, is, at the same time, forced up the eduction pipe H. On then raising the plunger E, the end *e* will be drawn out of, and the end *e'* will be drawn into, the chamber B, the valve *g* will close the opening G, and the other half of the water, forced into the chamber B, from the chamber C, on the previous down stroke of the plunger E, will be forced up the eduction pipe H, while at the same time water is drawn into the chamber C, as before, so that the water is raised into the chamber C only on the upstroke of the plunger E and is discharged from the chamber C only by the downstroke of the plunger E, but, the water is discharged from the chamber B, both, by the upstroke, and downstroke of the plunger E. The space in the chamber B, above, the bell mouthed opening of the eduction pipe H, and the bottom of the stuffing box *a*, *a*, *a*, *a*, acts as an air chamber.

I do not claim, broadly, the use of a plunger or piston, working in a chamber through a stuffing box, as pumps having that arrangement are in common use. I do not claim, broadly, the use of two pistons of different diameters, connected together, and having the same motion, the water raised into the pump at one stroke of one piston, being discharged from the pump by both strokes of the pistons; neither do I claim, broadly, the invention of inclosing one cylinder by another one to act as an air chamber.

My pump is superior to the plunger pump in use, first, because it is double acting in its discharge; consequently, the power required to operate the plunger up and down is nearly equal, and it will not therefore strain the machinery or muscles of the motive power as other plunger pumps do. Second, it does not require an additional air chamber. Third, air cannot accumulate to disadvantage in my pump. It cannot accumulate in the chamber C because the opening G is in the top of the chamber C, and the air that may accumulate in the chamber B, will act beneficially, as in the ordinary air chambers used. Fourthly, the water in chamber B being above the stuffing box *d*, *d*, *d*, *d*, serves to keep the passage of the end *e'* of the plunger E, air tight longer during the wear of the packing, so that the action of the plunger in the chamber C will not so soon be affected by the wear of the said packing. The wear of the packing in the stuffing box *a*, *a*, *a*, *a*, can only cause a loss of water from the chamber B, which can be readily prevented by merely screwing down the gland of the stuffing box. Lastly, one of my pumps can be constructed for, at least one fourth less cost, than other plunger pumps to do the same work, and will be much more durable and efficient.

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

The combination of the plunger E, constructed as described with the chambers B and C, the stuffing boxes *a*, *a*, *a*, *a*, and *d*, *d*, *d*, *d*, and the valves *f* and *g*, substantially in the manner described and for the purposes set forth.

ROBT. RAMSDEN.

Witnesses:
JOHN MAXWELL,
AARON PALMER.