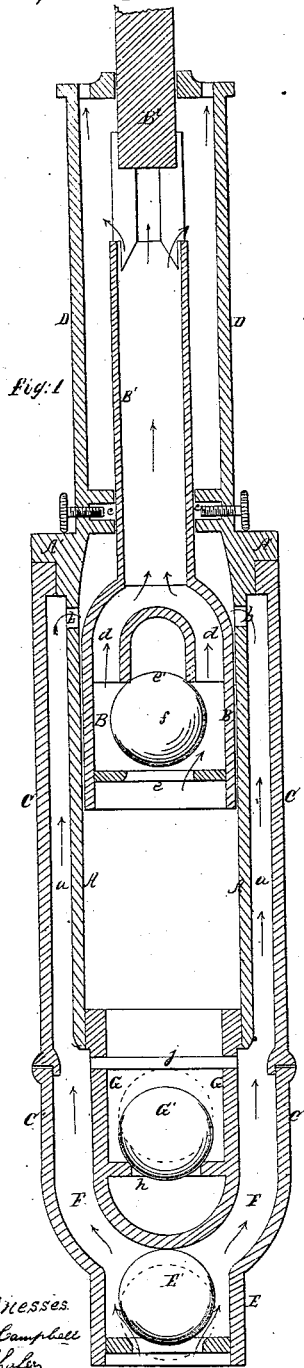


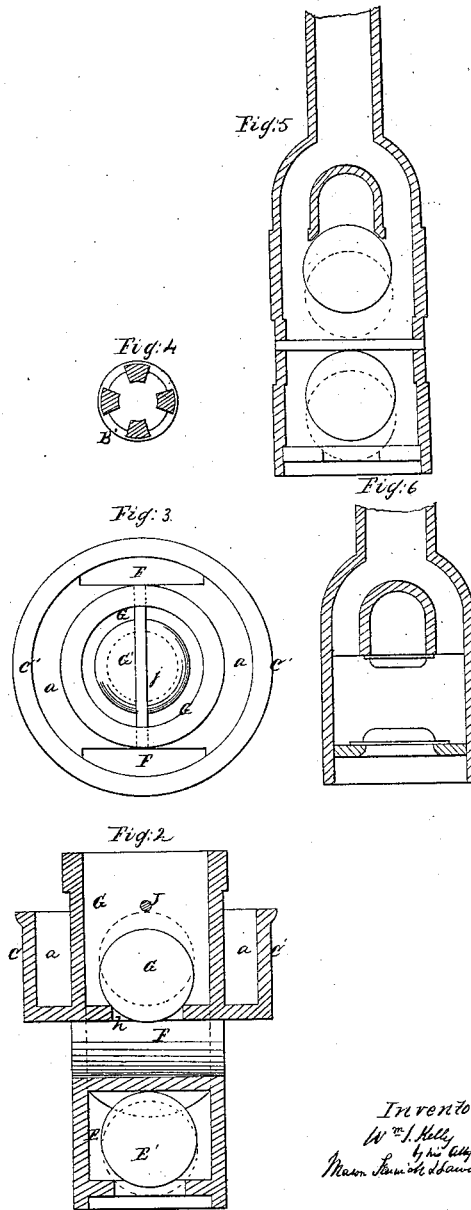
*W. S. Kelly,
Pump Lift,*

N^o 53,990.

Patented Apr. 17, 1866.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PUMPS FOR DEEP WELLS.

Specification forming part of Letters Patent No. 53,990, dated April 17, 1866.

To all whom it may concern:

Be it known that I, WILLIAM S. KELLY, of Schenectady, in the county of Schenectady and State of New York, have invented a new and useful Improvement in Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a diametrical section through my improved pump, representing the piston in the act of descending. Fig. 2 is a cross-section through the pump-base. Fig. 3 is a top view of the pump-base. Fig. 4 is a horizontal section of the discharge-openings of the hollow piston-rod. Figs. 5 and 6 show modifications of the piston of Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

The main object of my invention is to adapt a double-acting force-pump for use in Artesian wells by providing for the employment of separate and independent induction valve-chambers, one of which communicates with the upper end of the piston-cylinder and the other leads directly into the lower end of said cylinder over the induction-passage of the former, thereby enabling me to employ enlarged valves and valve-openings, and to arrange both valve-chambers in, or nearly in, the same vertical line, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A represents the piston-cylinder, within which works a piston, B, that will be hereinafter described.

C represents a cylindrical jacket which surrounds the piston-cylinder A and forms a chamber, *a*, that communicates with the cylinder A at its upper end by means of the perforations *b b b*. This outer cylinder, C, is secured at its upper end to the circular cap A' of the piston-cylinder in any suitable manner, which cap has a discharge-pipe, D, secured to it by means of screws and bolts, or the two parts A and D, with the annular flange or cap A', may be cast in one piece, as I have represented in the drawings, in which latter case the upper end of the cylinder or pipe D may have a screw-thread formed on it to receive another section, so as to continue the pipe for

the discharge of the liquid to the top of the well. If desirable, the pipe D, as shown in the drawings, may be dispensed with, and a pipe equal in diameter to the annular cap A' applied in any suitable manner to this cap.

At an intermediate point between the sections A and D, or just above the termination of the piston-cylinder A, is an annular chamber, C, through which passes the hollow portion B' of the piston-rod. This chamber is intended to receive any suitable packing and to form a stuffing-box for the piston-rod. That portion of the piston-rod which works through the stuffing-box C is hollow, and is so attached to the solid piston-rod B² that it discharges from its upper end into the pipe D. The lower end of this hollow piston-rod terminates in two branches, *d d*, which open into a hollow piston, B, as shown in Figs. 1, 5, and 6. This hollow piston is provided with one or more valves, of any suitable description, and two inlet-passages, *e e'*, which are alternately opened and closed as the piston rises and falls. I prefer to use a spherical valve, *f*, as shown in Figs. 1 and 2, although the trap-valves shown in Fig. 6 may be used. I do not desire to confine myself to any particular valve, as a variety of forms may be adopted.

The inlet-passage *e* enters the bottom of the piston, and the inlet *e'* receives the water which is above the piston when the latter is elevated.

The base of the pump consists of a hollow cylindrical neck, E, which forms a valve-chamber for the lowermost valve, E', and which communicates with the chamber *a*, and thence with the piston-cylinder A, above the piston, by means of one or more passages, F, as shown in Figs. 1 and 2. This valve-chamber E is arranged in, or nearly in, the vertical line of the body of the pump and below the valve-chamber G, which latter has an aperture through its bottom, as shown at *h*, through which liquid is admitted into the piston-cylinder below the piston. This valve-chamber is surrounded by a cylinder or casing, C', which is adapted to receive the lower end of the casing C, and the inner cylinder, which forms the valve-chamber and completely separates it from the chamber *a*, is provided with a screw-thread to receive and connect to it the lower end of the base of the piston-cylinder, as shown in Fig. 1.

The valve G' is prevented from rising too high by means of a rod, j , extending across the valve-chamber at a suitable height above the valve-seat.

It will be seen that I employ ball-valves altogether; but I do not desire to confine my invention to such valves, as trap or other valves may be used in the valve-chambers of the base of the pump.

When the piston B rises liquid is drawn into the piston-cylinder through the valve-opening h , and when the piston is depressed the liquid is drawn into the piston-cylinder through the valve-chamber E, passages F, a , and b , the water entering above the piston, as indicated by the arrows in Fig. 1. When the piston B is again depressed the water which is below it will be forced up through the hollow piston-rod B' into the pipe D, and when this piston is again elevated the water which is above it will be forced through the valve-opening e' and thence through the hollow piston-rod B' into the pipe D.

It will be seen, from the above description, that I am enabled to obtain an enlarged valve-chamber for the influx of water into the passage a when the piston is depressed without increasing the lateral area of the pump, and also to conduct the water directly through the bottom of the piston-cylinder over the induction-passage above referred to. Hence it will be seen that I adapt the pump for Artesian wells or wells which are but a few inches in diameter, and can make the pump, or the body of it, nearly as large in diameter as the bore of the well.

I am also enabled by my invention to employ an outer casing, C, and a chamber, a , entirely surrounding the piston-cylinder, and thus increase the capacity of the pump for receiving water without increasing its diameter.

In Fig. 5 I have represented a piston adapted for using two spherical valves instead of one, as represented in Fig. 1; and in Fig. 6 I have shown a piston having two trap-valves, which may be used, if desired, instead of the single or double spherical valves.

As my pump is designed especially for oil or Artesian and other deep wells, the importance of having the two separate receiving valve-chambers and the piston-valve within the circumference of the pump-base or circumference of the outer cylinder will be readily appreciated; for, if the inlets are not within this range, great inconvenience in adapting the pump to such wells will be experienced on account of their being bored to a very great depth and of a uniform, or nearly uniform, diameter from top to bottom. There

is also importance in having the pump-cylinder fit snugly the bore of the well at all points, and therefore the discharge must be within the diameter of the pump. To attain these advantages I have shown all the valves as arranged in the same central line; but it is obvious the valves of the two inlet-passages may be arranged on the same level and still be in separate chambers, which are within the circumference of the cylinders of the pump. One way of modifying the arrangement of the pump is to remove the part denominated the "base" and form a valve-chamber in the lower end of the cylinder A, and also a perforated seat for a series of small valves at the lower end of the cylinder C; or, if preferred, the parts G G' F may be used, and the parts E E' F' dispensed with; but in this case the seat and series of small valves would be used in the lower end of the cylinder C.

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

1. Constructing the pump with separate and independent receiving valve-chambers E G, or their equivalents, as described, said chambers being within the circumference of the cylinders A C, or within the circumference of the base of said cylinders, and also communicating with the interior of piston-cylinder both below and above the piston, substantially as and for the purpose set forth.

2. An induction valve-chamber communicating with the interior of the top of the piston-cylinder, in combination with another induction valve-chamber communicating with the interior of the bottom of the piston-cylinder, both of said chambers communicating with a central discharge-pipe and being arranged within the circumference of the pump, substantially as described.

3. The inverted arched passage or passages F F', leading from a valve-chamber, E, and communicating with an induction-chamber, a , surrounding the pump-cylinder A, in combination with the valve-chamber G, substantially as described.

4. The pump-base with a valve-chamber, G, and a jacket, C', entirely encircling the same, in combination with the valve-chamber E, substantially as described.

5. The combination of the cylinders A and C with valve-chambers E and G, and the hollow discharging-piston and piston-rod B B', substantially as described.

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Witnesses:

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