(No Model.)

J. A. FINK.

PUMP.

No. 588,918. Patented Aug. 24, 1897.

Fig. 1.

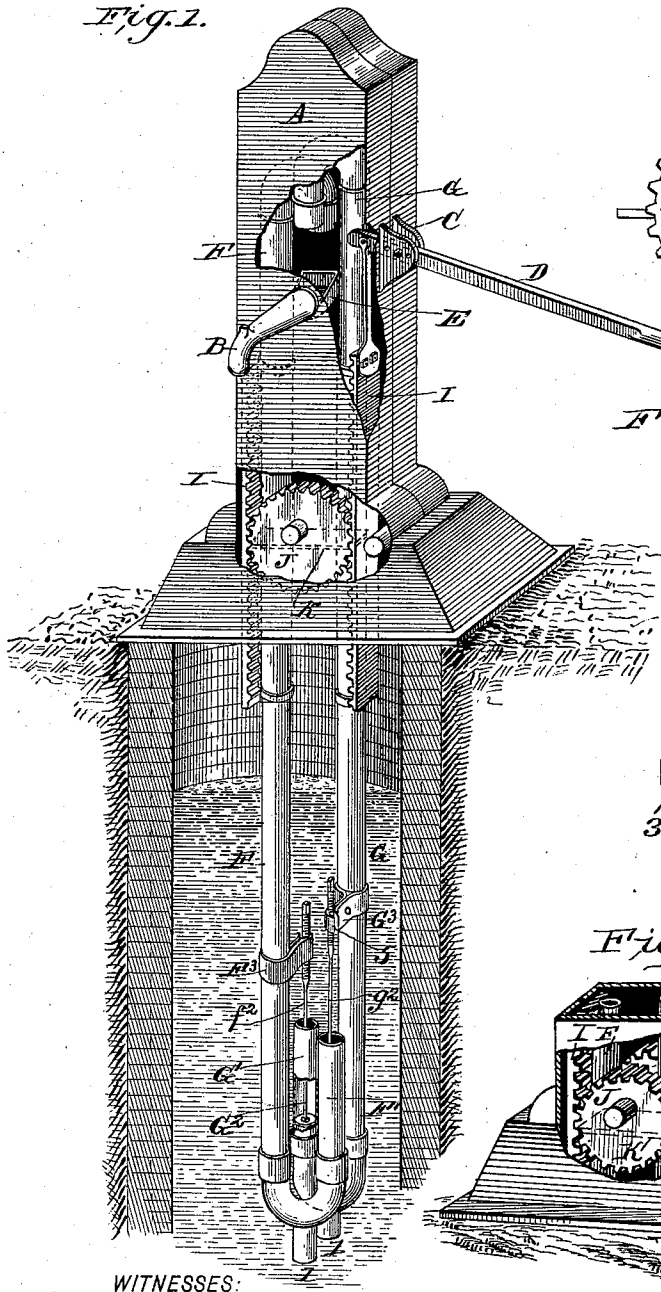


Fig. 2.

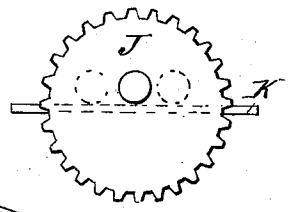


Fig. 3.

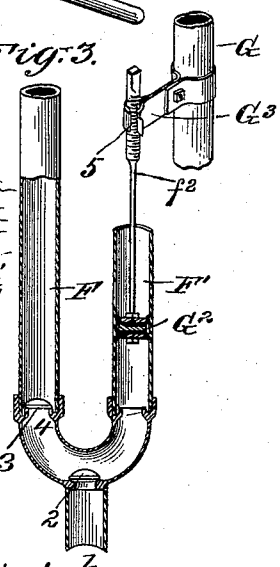
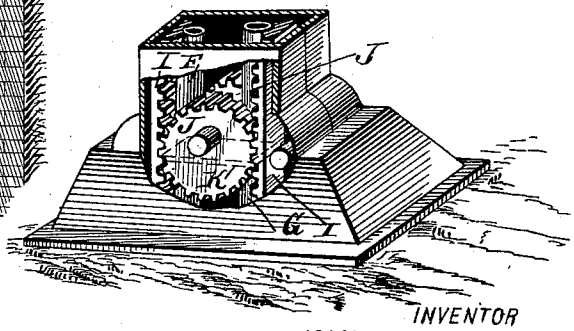


Fig. 4.



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PUMP.

SPECIFICATION forming part of Letters Patent No. 588,918, dated August 24, 1897.

Application filed December 3, 1894. Serial No. 530,672. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. FINK, of Russell Springs, in the county of Logan and State of Kansas, have invented a new and useful Improvement in Pumps, of which the following is a specification.

My invention is an improvement in pumps, and has for its object, among others, to provide a pump which will require only such power to operate as is necessary to lift the amount of water discharged.

The invention has for a further object to provide a novel construction of the reciprocating water tubes and cylinders.

The invention has for a further object to provide a novel construction of the intermediate connections between the water tubes or cylinders whereby to counteract or compensate for the momentum of the said pipes and the water they contain during operation.

The invention has for a further object to provide such arrangements of parts as will give to the stroke of the plunger in the cylinder double the stroke given by the lever of the pump, yet so closely and compactly disposed as to be practicable for use in bored or drilled wells.

The invention has for a further object to provide a novel construction of the intermediate connections between the water tubes or cylinders whereby to counteract or compensate for the momentum and inertia of the pipes, plungers, and cylinders and the water they contain during operation and of their inertia at the start of each stroke of the pump.

The invention has for further objects other improvements; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a perspective view of my pump, parts being broken away and others shown in section. Fig. 2 is a detail view of the pinion and its supports, and Fig. 3 is a detail view showing parts of both the reciprocating tubes. Fig. 4 is a detail perspective view showing the double pinion and double rack.

The pump-body A has a suitable spout B and a support C for the handle D, which connects with one of the pump-tubes F G. These tubes F and G are movable reciprocally in the well and body A, and have inlets 1 at their lower ends; valves 2, controlling such inlets; cylinder portions F′ and G′; valves 3, controlling the passage 4 between such cylinder and the main portion of the tubes, and pistons F^2 and G^2, operating, respectively, in the cylinders F′ and G′. It will be noticed that the cylinders F′ and G′ are turned upward from the lower ends of the tubes F and G, and the rods f^2 and g^2 of pistons F^2 G^2 are threaded at their upper ends, and thus connect adjustably with brackets F^3 G^3, secured to the vertically-movable water-tubes. As shown, I connect the piston-rod of the cylinder of tube F to the tube G, and vice versa, and the result is that as said tubes alternately rise water is discharged from their upper ends. It must be understood that the discharge from each tube occurs during the upward movement of such tube; also, that the plunger enters its cylinder double the distance said tube and cylinder ascend, thus discharging double the amount of water thrown in some pumps whose cylinders or whose plungers remain stationary. The result is a continuous discharge into a trough or other vessel E, whence it flows from the pump-spout.

The brackets connecting the piston-rods to the tubes F and G are clasped to such tubes by means of bands or cuffs encircling the tubes and clamped by suitable bolts, so the brackets may be adjusted upon the tubes and the threaded piston-rods turn in split bearings at 5.

It will be seen that the piston-rods have wrench-heads above their threaded portions, and below such portions are made sufficiently slender to slip laterally into and out of the split bearings of the brackets. By this construction the piston may, by means of suitable wrenches and grapples, be readily manipulated from the surface.

The tubes F and G are connected so that the movement of one in one direction effects a reverse movement of the other tube, and this is preferably effected by means of two double-toothed racks I, clamped to said tubes, and double pinion J, operating between and

meshed with both such double racks. The sections of this double pinion are on a common shaft or trunnion and lap along the opposite sides of the two tubes, the teeth of the racks extending laterally beyond the tubes, as shown, so the pinions and tubes operate to guide and steady each other. Now in operating the column of water in one tube will be balanced by that in the other, and in the present pump I support the two movable tubes on two arms of a lever, such lever being the double pinion.

In my pump I seek to obviate or overcome any difficulty resulting from the momentum or inertia of the pipes and the water-pipes and the water therein by setting the pinion-shaft off the center, so the pipes come to rest when that part of the pinion farthest from the shaft is down or directly below said shaft. Now in moving pipe F up and pipe G down the double pinion will turn until at one-quarter revolution of double pinion the pipe G will be hanging on the short arm and the pipe F on the long arm of the lever constituted by said pinion. Thus toward the end of the stroke just described the effect of changing from equal to unequal arms of the lever is to overcome the momentum of the pipes. Calling this the end of the stroke of the pump, the position of the pipes and their relative lever-arms is such as to start F down and G up, thus overcoming the inertia of the pipes, cylinders, plungers, and water until the pinion revolves until the pipe F is on the long arm of the lever and the pipe G on the short arm of the lever and momentum is again overcome and inertia is also overcome ready to start the reverse stroke of the pump.

To avoid any lateral swaying of the pipes resulting from the eccentric arrangement of the shaft, I provide a bearing K, on which such shaft is free to roll from side to side. In practice I find it preferable to so locate the shaft on the pinion that the distance of the center of the axle from the center of the pinion-lever must equal one-fourth the circumference of said axle.

When pipe F and its cylinders and the plunger carried by pipe F are descending, the plunger in cylinder F′ is drawn out double the distance of the descent of the pipe F, sucking water into said cylinder and at the same time pipe F and its water acts upon the plunger of cylinder G′, forcing the water up and out of pipe G, and vice versa, on the reverse stroke, the two pipes and water-columns constantly counteracting each other's weight, so that the only power required is that necessary to lift the water discharged and to overcome friction.

It will be seen that by the arrangement of the parts the pipes are hung very closely together by allowing the upper ends of the pipes to come between the outer portions or toothed sections of the double pinion and by the close arrangement of cylinder and pipes at the bottom, so that the pump may pass into small space, such as drilled or bored wells. I also have the mechanism so that all parts are suspended from above, thus requiring no framework or other supports at the bottom of the well to which to anchor or fasten either the cylinders or plungers; also, the stroke of the pump produces a double length of stroke of the plungers in the cylinders, thus raising double quantity of water.

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

1. A pump having two vertically-reciprocating pipes, cylinders communicating with the lower ends of such pipes movable vertically therewith and upturned therefrom and plungers operating in said cylinders, the plungers operating in the cylinder of each pipe being secured to and movable vertically with the other pipe whereby to give a double length of stroke to the plungers and to discharge water from the ascending pipe of the pair substantially as and for the purposes set forth.

2. In a pump substantially as described the combination with the plunger-rod of the bracket supporting the same and having an opening to receive the plunger-rod and a contracted slit or opening leading outward from the rod-opening of less width than said opening, the plunger-rod having a reduced portion which may be slipped laterally through said opening all substantially as and for the purposes set forth.

3. In a pump a plunger-rod having a threaded portion and a reduced portion adjacent thereto combined with the bracket having a threaded seat for the threaded portion of the plunger-rod and a lateral slit forming a passage for the introduction and withdrawal of the reduced portion substantially as set forth.

4. A pump having a pair of pipes and a pinion on which said pipes are hung, the shaft of said pinion being off its center and arranged as described whereby the ascending pipe at the end of its upstroke is on the long arm of the pinion-lever and the descending pipe on the short arm and mechanism independent of said pinion whereby to reciprocate the said pipes substantially as set forth.

5. In the pump described the combination of the pipes F and G, the check-valves therein, the connections, the valves 2 thereof, the cylinders F′ and G′ fixed to said connections, the plungers arranged and operating in said cylinders and the brackets F^3 and G^3 arranged and connecting said plungers with said pipes in the manner substantially as and for the purpose specified.

6. In a pump the combination of a pair of vertically and alternately reciprocating cylinders provided with open upper ends and side discharge-passages water-discharge pipes

connected fast at their lower ends with the cylinders and communicating with said discharge-passages to carry off the water discharged from the cylinders, means for alternately reciprocating said pipes, and the plunger-rods carrying at their lower ends plunger-heads for the cylinders and the upper end of the plunger-rod for one cylinder being adjustably and detachably connected with the discharge-pipe for the other cylinder substantially as set forth.

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Witnesses:
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