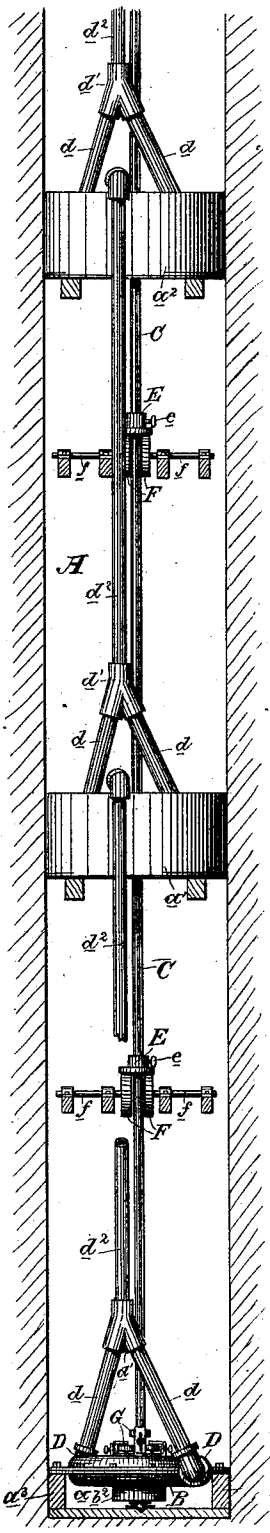
(No Model.) 2 Sheets—Sheet 1.

I. P. LAMBING.

CENTRIFUGAL PUMP SYSTEM.

No. 367,918. Patented Aug. 9, 1887.

Fig. 1.



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CENTRIFUGAL PUMP SYSTEM.

No. 367,918. Patented Aug. 9, 1887.

Fig. 2.

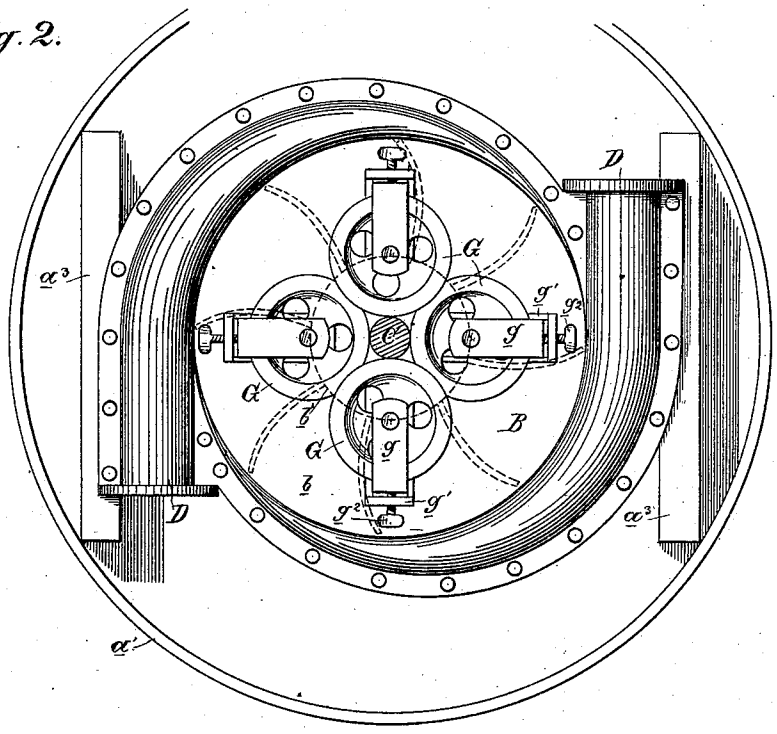
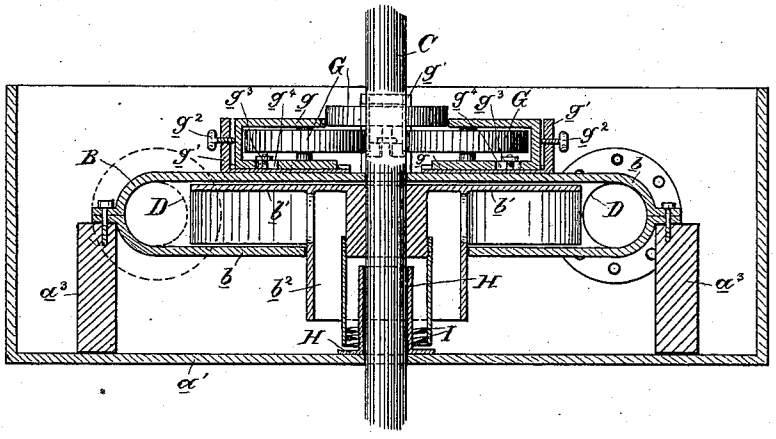


Fig. 3.



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UNITED STATES PATENT OFFICE.

ISAAC P. LAMBING, OF IONE, CALIFORNIA.

CENTRIFUGAL-PUMP SYSTEM.

SPECIFICATION forming part of Letters Patent No. 367,918, dated August 9, 1887,

Application filed October 30, 1886. Serial No. 217,631. (No model.)

To all whom it may concern:

Be it known that I, ISAAC P. LAMBING, of Ione, Amador county, State of California, have invented an Improvement in Centrifugal-Pump Systems; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of centrifugal pumps so arranged in a vertical series as to present a practical system; and my invention consists in the construction and combination of devices which I shall hereinafter fully describe and claim.

The object of my invention is to provide a system of centrifugal pumps whereby water may be raised to any height, either from the bottom of a deep well or the shaft of a mine, or may be elevated to the top of a suitable tower, forming part of a system of city or town water-works, from which it may be distributed. I am enabled to arrange this system with a vertical series of pumps by the employment of the peculiar and novel shaft-bearing which was patented by me August 17, 1886, numbered 347,431, and to which I shall hereinafter refer. The system is also made more practicable by reason of the various other improvements, to be hereinafter described.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is an elevation of my pump system. Fig. 2 is a plan of same. Fig. 3 is a vertical section through one of the tanks and pumps.

A is the shaft of a mine or a deep well. In the bottom is located a tank, *a*, a second tank, *a'*, being located above, and a third, a^2, still farther up, and as many more as may be desired in the vertical series. In each tank is a centrifugal pump, B, consisting of a casing or shell, *b*, and a driver or piston, *b'*.

C is the central shaft by which all the pumps are operated. It passes down through all the tanks to the bottom of the shaft or well, and the driver of each pump is keyed to it. The pumps are of the ordinary construction generally, but differ therefrom in having two oppositely-located discharges, D, the pipes *d* from which unite above at *d'* in the common and single discharge-pipe d^2, which extends from each pump to the tank next above, and is adapted to discharge its contents therein.

The object of the oppositely-arranged double discharge is to relieve the shaft C of the side strain and consequent wear to which it and its box are subjected when but a single discharge is used. The pumps are all operated simultaneously by suitable power applied to the central shaft, C, but which is herein not necessary to show. The central or driving shaft of a centrifugal pump is always mounted in a step at the bottom, and so much friction is engendered in this step that it has to be renewed very frequently, as the shaft has a tendency to set or weld in it and stop the operation. If this is the case with a single pump, it will be seen how impracticable it would be to arrange in a similar manner a vertical series of pumps, as the friction would be so great in any ordinary bearing or step as to prevent their operation; but with the bearing which I shall now describe, and which I have heretofore patented, this difficulty is entirely overcome, and I am enabled to arrange and to practically operate the vertical series of centrifugal pumps.

Upon the central shaft, C, at any suitable points and in any suitable number, I mount a collar or tappet, E, which may be moved up and down on the shaft, but which is fixed in any desired place by set-screws *e*. F are anti-friction wheels mounted on the shafts *f*. There are two of these wheels in each set, and the shaft passes down between them.

In arranging for the mounting of the system I raise the shaft C, so that it does not rest in the step below, and I then move down each collar or tappet on said shaft until it rests upon the tops of the anti-friction wheels, and in this position I firmly fix it by the set-screws, so that the shaft and all the pump-drivers keyed thereto are sustained upon the sets of anti-friction wheels. These bearings reduce the friction to a minimum and avoid the frequent replacement of a step below, as would otherwise be necessary. The rotation of the shaft is not impeded in any way, as its collars or tappets turn the loosely-playing anti-friction wheels. In order to steady the shaft C, I have the anti-friction wheels G. These are mounted in brackets *g*, which are adapted to slide in bearings *g'*, firmly fixed to the top of each pump-casing *b*. The brackets are adjusted by means of screws g^2, and are fixed by means of bolts g^3

passing through slots g^1, whereby the wheels may be set up. These wheels bear upon the shaft on all sides and steady it. The location of the wheels G′ upon the pump-casings is essential, from the fact that the shaft C needs steadying more in the vicinity of the pump-drivers than anywhere else, for the strain is the greater at those points.

As will be seen in Fig. 3, the casing b of the pump is bolted on timbers a^3 in each tank, and its driver or piston has a hollow hub, b^2, which projects downwardly through the casing to near the bottom of the tank. This construction of the hub, projecting downwardly, as described, avoids the necessity of submerging the entire pump in the water of the tank, so that it can be readily reached for the adjustment, if necessary, of the various parts connected therewith.

In order to provide against leakage where the shaft C passes through the tanks, I secure to the bottom of the tank a tubular piece, H, the upper end of which terminates just a little short of the bottom of the driver of the pump.

The hollow hub b^2 of the driver is preferably formed by concentric tubular pieces, the inner one of which is provided on its inner side with a spiral flange, I, which projects toward the tubular piece H. The direction of this flange is such that in rotating it forces downwardly the water upon which it acts. It will now be seen that as the driver rotates, the water which would otherwise rise above the level of the tubular piece H, and so get into the shaft-journal, is kept down and forced outwardly by the spiral flange, thereby preventing leakage around the shaft.

In operation the water is sucked from the bottom of the tank through the hollow hub b^2 into the casing of the pump, where it is operated on by the driver or piston, and is forced through the oppositely-located discharges. The employment of centrifugal pumps in a system of this character is advantageous in that a very large amount of work may be derived from comparatively small pumps running at a high rate of speed and with comparatively small cost.

In deep mines, where ordinary pumps are employed, drawing from tanks at different levels, the pumps are very large and operate at a very slow speed; but with my system the small but powerful centrifugal pumps can be employed, and on account of material reduction in the friction may be operated at a high rate of speed, thereby giving good results.

Although I have described a tank, a, in the bottom of the well, it is obvious that the lowermost pump of the series may, instead of being located in a tank at that point, be supported on timbers placed directly in the bottom.

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

In a centrifugal-pump system, the tank, the pump, and the shaft by which the pump is driven, in combination with the means for preventing leakage where the shaft passes through the tank, consisting of the tubular piece H, secured in the bottom of the tank and surrounding the shaft, the downwardly-extending hub of the driver of the pump, and the spiral flange on said hub within the space between it and the tubular piece, substantially as herein described.

In witness whereof I have hereunto set my hand.

ISAAC P. LAMBING.

Witnesses:
C. D. COLE,
J. H. BLOOD.