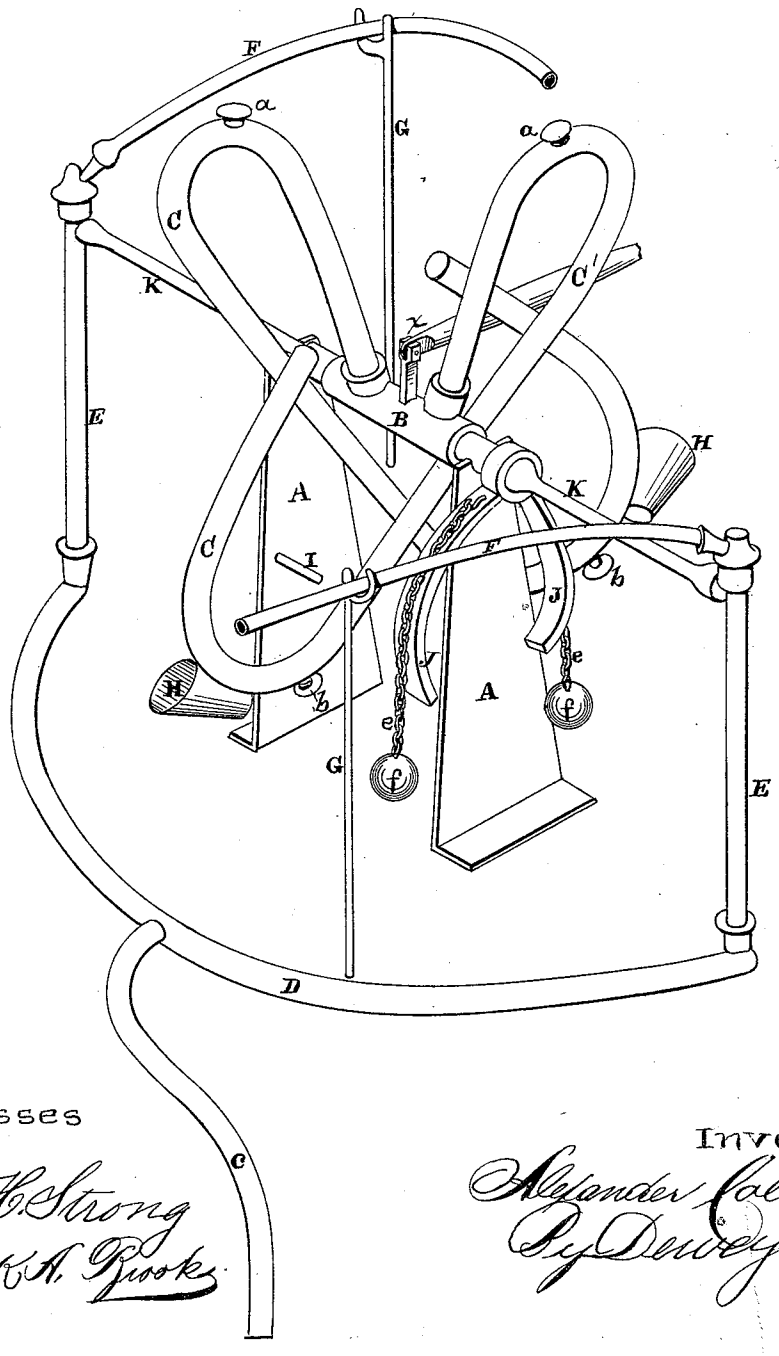
2 Sheets—Sheet 1.

A. COLLIE.

Water-Lifter.

No. 217,775. Patented July 22, 1879.

FIG. 1.



Witnesses

Geo. H. Strong

Frank A. Brooks

Inventor

Alexander Collie

By Dewey & Eddy

2 Sheets—Sheet 2.

A. COLLIE.
Water-Lifter.

No. 217,775. Patented July 22, 1879.

FIG. 2.

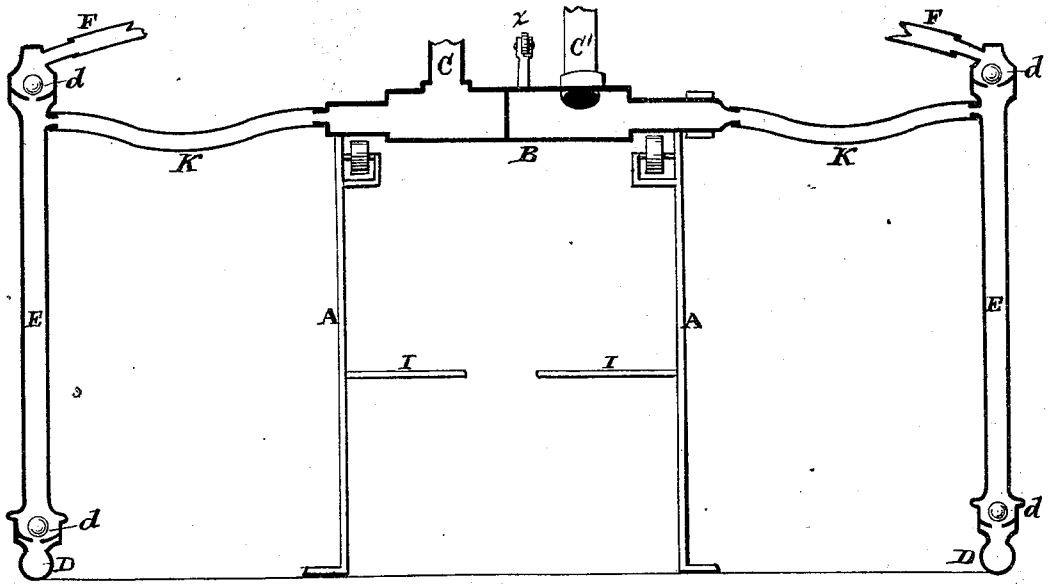
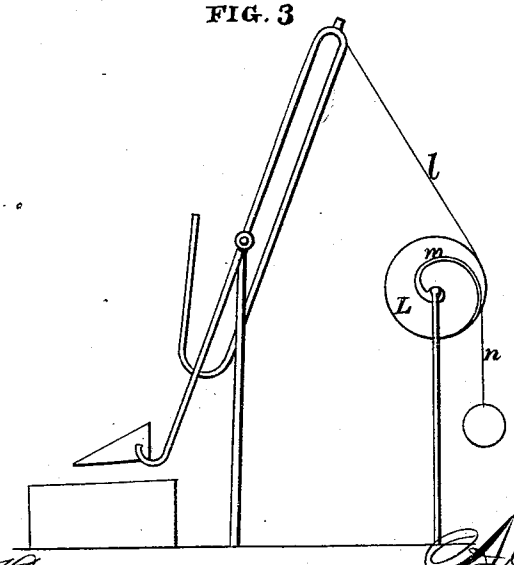


FIG. 3



Witnesses

Geo. H. Strong

Frank A. Brooks

Inventor

Alexander Collie

by Dewey & Co Attys

UNITED STATES PATENT OFFICE.

ALEXANDER COLLIE, OF MODESTO, CALIFORNIA, ASSIGNOR OF ONE-SIXTH HIS RIGHT TO ALEXANDER BRICHMAN, OF SAME PLACE.

IMPROVEMENT IN WATER-LIFTERS.

Specification forming part of Letters Patent No. **217,775**, dated July 22, 1879; application filed May 7, 1879.

To all whom it may concern:

Be it known that I, ALEXANDER COLLIE, of Modesto, county of Stanislaus and State of California, have invented an Improved Water-Lifter; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improved water-lifter; and my improvements consist in certain details of construction and operation by which a column of mercury is utilized in producing a vacuum which will lift water from a well. Double sets of tubes are used, one balancing the other, and the discharge of the water is utilized in increasing the weight of the tube in which the mercury is lifting the column, as is more fully described in the accompanying drawings, in which—

Figure 1 is a perspective view. Fig. 2 is a vertical section. Fig. 3 is a modification.

Let A represent the standards carrying the journals on which the hollow shaft or trunnion B oscillates. On the hollow spindle or trunnion, and communicating with it, are two peculiarly-shaped oppositely-placed tubes or pipes, C C′, which are intended as receptacles for mercury, for the purpose hereinafter described. The hollow shaft is divided by a diaphragm between the two tubes, so there is no connection between them, one drawing water through one end, and the other through the other end.

Priming cocks or plugs *a* are placed at the upper bends of the pipes, and discharge or cleaning cocks *b* at the lower bends, as shown. The pipe *c* leads to the well and communicates with the pipe D, which connects with the two upright pipes E at opposite ends of said pipe D. These pipes E in turn communicate with the flexible joints or swiveled pipe K, connected with the ends of the hollow shaft or trunnion, as shown. Discharge-pipes F are attached to the upper ends of the pipes E, and are held in a suitable position by rests G, so as to discharge into the buckets H on the bends of the tubes C, for the purpose hereinafter described. Check-valves *d d′* are placed at the lower ends of the pipe E, and also at the upper end of said pipe, between the discharge-pipes F and swiveled pipe K.

Lugs or projections I are secured to the standards to prevent the tubes C oscillating past a certain point. At one end of the spindle or trunnion is a spreading-yoke, J, grooved on its edges, and having chains *e* passing down both sides, on which are suspended weights *f*, as shown, for the purpose hereinafter described.

To prepare my apparatus for operation the pipes are swung one after the other to a perpendicular position, and the mercury introduced through the open ends. They are then allowed to swing, so as to balance each other, and are primed with water through the cock or plug *a*. The water will then run down through the hollow trunnion and fill the pipes E and D. The cock *a* is then closed. The water can flow down no lower in the pipes D than the check-valves *d;* but in first starting the pipes leading to the well below the check-valve *d* may be filled with water also. The apparatus is now ready to run. Power may be suitably applied in any convenient manner to oscillate the shaft or spindle. As the shaft is oscillated the pipe or tube C will assume a horizontal position, and the other tube, C′, will strike against the lug I to prevent too great oscillation of the shaft. The mercury in the tube C will now flow back, so as to fill the longest part of the tube and reach part-way up into the bends, while the mercury in the tube C′ will flow down into the lower bend of said tube. As the shaft is oscillated back again the position of the tubes and mercury is reversed. As the mercury in the tube C begins to flow downward toward the larger bend at the open end a vacuum is formed behind it, which draws the water up from the well through the hollow spindle, flexible pipe K, pipes E, and their lower check-valves, *d*, pipes D and *c*. As soon as the mercury in the tube C has fallen to its lowest limit the flow of water ceases and the check-valve *d* prevents it passing back into the well.

As the shaft is again oscillated and the mercury flows back again, as at first, it forces the water which has been drawn into the tube behind the mercury, back again through the hollow trunnion, flexible tube K, and pipe E, out through the valve *d′* into the discharge-pipe F. As the water flows from this dis-

charge-pipe it passes into the bucket H on the outer bend of the tube, and as this water enters the bucket it assists the return movement of the tube in overbalancing the other tube, the bucket of which is at that time empty, having discharged its contents into a tank below.

The peculiar arrangement of the yoke with its balls and chains also assists in the return movement, since the curved yoke on the upstroke is thrown out of the center over the shaft, and the ball hangs to one side of said shaft, the other one being immediately under the shaft. The water in the bucket and the ball on the yoke both therefore assist the return of the tube in raising the water from the well, while on the opposite tube the bucket is empty and the ball under the center of the shaft.

As soon as the water is discharged from the cup the tube is lighter, and the cup on the other side being filled, as described, the balance of weight is in favor of the tube drawing the water.

In this way the weight of mercury in oppositely-placed tubes on the same hollow spindle will serve to form a vacuum to draw water from a well and force it somewhat higher than it is first raised. Any number of these tubes may be employed in couples on the same hollow trunnion, or one alone can be used. With two, however, the action of lifting the water is continuous, it being raised first on one side and then on the other.

Fig. 3 shows a modification of the balancing arrangement. On the platform carrying the standards is mounted a grooved pulley, L, on which is wound a cord, *l*, the opposite end of which is secured to the upper end of the tube. On the side of this pulley is a spiral, *m*, carrying a cord, *n*, and weight, said cord *n* being secured at the center of the spiral. With this arrangement, when the tube is at its most vertical position, the cord *l* is unwound from the pulley and its end is on the periphery. At the same time the cord *n*, carrying the weight, is taken up on the spiral, so that the weight, will also be at the periphery of the pulley immediately under the end of the cord, and the weight will act as a lever in drawing the upper end of the tube down.

A separate pulley with cords and weights is provided for each tube, and on the opposite tube the cord hanging over the spiral hangs at the center of the pulley, so that the one previously referred to overbalances it. As the other tube is raised the reverse action takes place.

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

1. The tubes or receptacles for mercury C C′, provided with the buckets H, and arranged to oscillate on the hollow shaft B, having the yoke J, with chains and weights, by which the mercury is caused to change its level alternately, so as to form a vacuum to draw water, and its weight is utilized in forcing said water higher than the shaft, substantially as herein described.

2. The tubes or receptacles C C′, with their buckets H, arranged to oscillate on a hollow shaft provided with a yoke, J, with the chains *e* and weights *f*, in combination with the flexible pipes K, pipes E, with their check-valves and pipes *c*, D, and F, whereby water is drawn and discharged from a well, substantially as herein described.

3. The mercury-containing tubes C C′, mounted on the oscillating shaft B, with their self-discharging buckets H, said tubes being connected with the discharge-pipes F for filling said buckets alternately, in combination with the supplementary frame A, provided with the lug or stop I, whereby the oscillating motion is produced and the mercury caused to change its level, substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

ALEXANDER COLLIE.

Witnesses:
CHAS. G. YALE,
FRANK A. BROOKS.