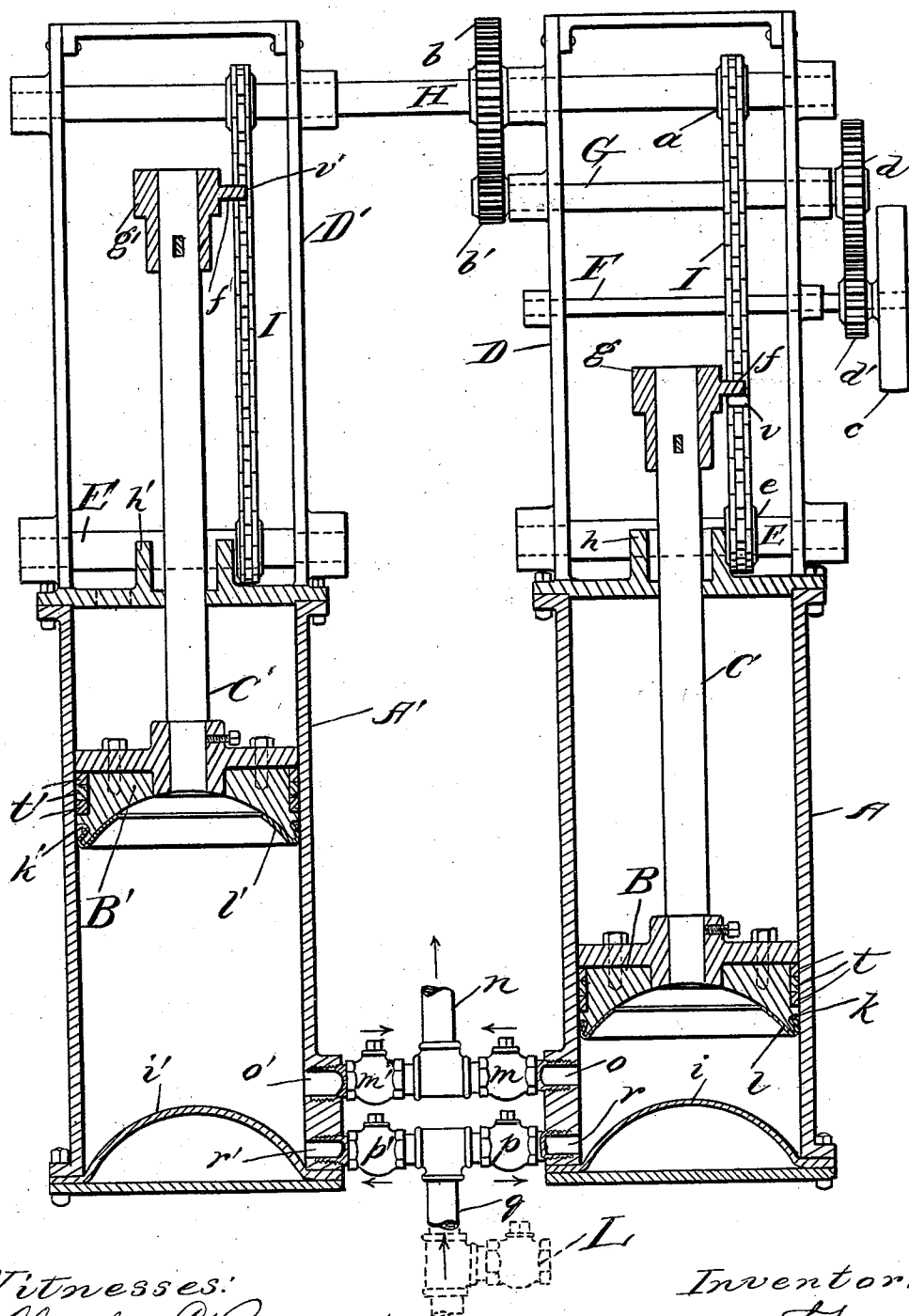


(No Model.)

I. T. DYER.
GRAVITY POWER PUMP.

No. 555,724.

Patented Mar. 3, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

ISAAC T. DYER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
CHARLES J. STROMBERG, OF SAME PLACE.

GRAVITY-POWER PUMP.

SPECIFICATION forming part of Letters Patent No. 555,724, dated March 3, 1896.

Application filed May 13, 1895. Serial No. 549,047. (No model.)

To all whom it may concern:

Be it known that I, ISAAC T. DYER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Gravity-Power Pumps, of which the following is a specification.

The object of my invention is to provide a pump for generating fluid-pressure for use as power which shall require for operating it the exertion of comparatively little power to produce a high degree of pressure.

Generally stated, my improved pump involves a vertically-disposed cylinder having an inlet and an outlet in its lower end portion, the former leading from a source of fluid-supply, as the outer air, or a liquid-reservoir, and preferably from the exhaust of a steam or air pressure engine, and the latter leading to a storage-reservoir or to a point of utilizing the power. The cylinder contains an adequately heavy piston on a rod provided with a projection extending into the path of a finger projecting from an endless vertically-traveling belt geared to an extraneous driving power in a manner to cause the exertion of comparatively little power to raise the piston by the travel of the endless belt, and thus suck into the cylinder the fluid to be compressed; and when the piston attains the desired highest point of elevation it is automatically released from engagement by the endless belt by separation of the finger and projection owing to the change of the course of the point of engagement on the endless belt from ascending to descending, and drops by its own gravity to compress and force out of the cylinder the introduced fluid.

The accompanying drawing shows my improved gravity-power pump by a view in sectional elevation, partly broken, with parts duplicated.

A is a cylinder supported in vertical position and containing in its side near the base portion an inlet *r*, to which leads a supply-pipe *q* containing an inwardly-opening check-valve *p* and above the inlet an outlet *o*, from which there leads the pipe *n*, containing an

outwardly-opening check-valve *m*, to a place of storage (such as a reservoir, not shown) or to a point of using the generated pressure.

B is a piston in the cylinder, of adequate weight to exert by its gravity descent the desired degree of pressure. The piston may involve any suitable construction and should be surrounded by packing-rings *t*. I prefer, however, to form the piston concave on its underside to enable the application about its circumferential lower edge of packing *l* in a peculiar manner. The packing *l* is preferably rubber, applied to fit about the inner surface of the concavity in the bottom of the piston from some distance upward therein to the lower circumferential edge, about the exterior of which it is provided with a recess *k*, into which the edge of the packing is turned to lap over the edge about the concavity in the bottom of the piston, and the packing is fastened in the recess *k*.

The advantage of the construction with the packing *l* is that in the descending stroke of the piston the frictional contact of the packing about the circumferential edge of the concave bottom of the piston with the wall of the cylinder tends to pull the packing downward from the concave surface and pack it the more between the piston and cylinder-wall, thereby insuring greater tightness, and in the rise of the piston the tendency of the friction of the cylinder-wall against the packing *l* is to force it back into the concavity in the bottom of the piston, and thus ease the rise of the latter.

I prefer to form in the cylinder a convex bottom *i* on the lower head to conform to the convex bottom of the piston.

The piston-rod C passes through a cushion-cup *h* on the upper head of the cylinder, and carries at its outer end a head *g* adapted to enter at its lower portion the cup *h*, and provided with a lateral projection *f*.

Above the cylinder there extends a frame D, affording bearings for the rotary shaft E carrying a sprocket-wheel *e*, the rotary shaft F carrying at one end a pinion *d'* and beyond the pinion a belt-wheel *c*, the rotary

shaft G carrying at one end a gear-wheel *d* meshing with the pinion *d'*, and at its opposite end a pinion *b'*, and the shaft H carrying a sprocket-wheel *a* and a gear-wheel *b* meshing with the pinion *b'*.

I is an endless chain, affording an endless traveling belt, adjusted upon the sprocket-wheels *a* and *e* and carrying a finger *v*, into the path of which the projection *f* on the head *g* extends.

At L is indicated an inwardly-opening check-valve for supplying air from without to the pump when atmospheric air is the fluid to be compressed therein.

By driving the shaft F the chain I is caused to travel, its course being in the direction to cause its finger *v* to engage the projection *f* from underneath and thereby carry the piston upward along with it till the finger passes over the sprocket *a*, in doing which it is withdrawn from the projection, leaving without support the piston, which in its rise has sucked into the cylinder fluid through the inlet *r*. Upon the release of the piston it drops, compressing and forcing ahead of it out of the outlet *o* the fluid into the pipe *n*. The head *g* cushions in the cup *h*, and the piston also cushions against the remnant of fluid always in the base of the cylinder and provided for by placing the outlet above the inlet.

As will be seen, the relative arrangement of the gearing, while rendering the lifting of the piston a slow operation, affords leverage sufficiently great to enable a heavy piston to be raised with the exertion of but little power on the shaft F, so that a small electric motor may be used for operating the pump.

The drawings show the parts thus described, except shafts F and G and the gearing, to be duplicated in a second pump with the shaft H extended to render it common to both pumps. The duplicate parts of the second pump are denoted by the same reference-letters as their counterparts in the first pump; but they are distinguished by prime-marks, except where they employ the inlet-pipe *q* and the discharge-pipe *n* in common. The second operates precisely like, and is operated from, the first pump, the arrangement, however, being preferably such as to have the piston in the one in the act of falling while that in the other is being raised. In the same way that two of the pumps are thus coupled together to be all driven from the same shaft

F any desired number of such pumps may be similarly coupled and operated.

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

1. A gravity-power pump comprising a cylinder having in its lower end portion an inlet and an outlet provided with valves, the inlet being below the outlet, a piston-rod working through the upper head of the cylinder, a piston on the inner end of said rod, an endless traveling belt carrying a finger, a projection on the outer end of said rod and extending into the path of said finger to be engaged thereby to raise the piston and disengaged from said finger by the changing of its course from ascending to descending, and a drive-shaft having a reducing-gear connection with the endless belt to actuate it, substantially as and for the purpose set forth.

2. A gravity-power pump comprising a cylinder having an inlet and an outlet provided with valves, a piston in the cylinder on a rod and having a concave bottom provided with an exterior circumferential recess and covered with packing *l* overlapping the outer edge of said concave bottom, and fastened in said circumferential recess, an endless traveling belt, means on the belt and rod for engaging them to raise the piston and automatically releasing the rod when raised to permit the piston to drop by gravity, and a drive-shaft having a reducing-gear connection with the endless belt to actuate it, substantially as and for the purpose set forth.

3. A gravity-power pump comprising a cylinder A having the inlet *r* and outlet *o* provided, respectively, with check-valves *p* and *m*, a piston B in the cylinder on a rod C extending through the upper cylinder-head and carrying a head *g* provided with a projection *f*, a cushion-cup *h* on said cylinder-head with which said head *g* co-operates, a frame D above the cylinder, shafts supported on the frame near its opposite ends and carrying sprockets *e* and *a*, an endless chain I on said sprockets and carrying a finger *v*, and a drive-shaft F journaled in the frame and having a reducing-gear connection with one of said sprocket-wheels, substantially as and for the purpose set forth.

ISAAC T. DYER.

In presence of—

J. H. LEE,

J. N. HANSON.