J. R. CUSHIER.

Pump.

No. 222,250. Patented Dec. 2, 1879.

Fig 2.

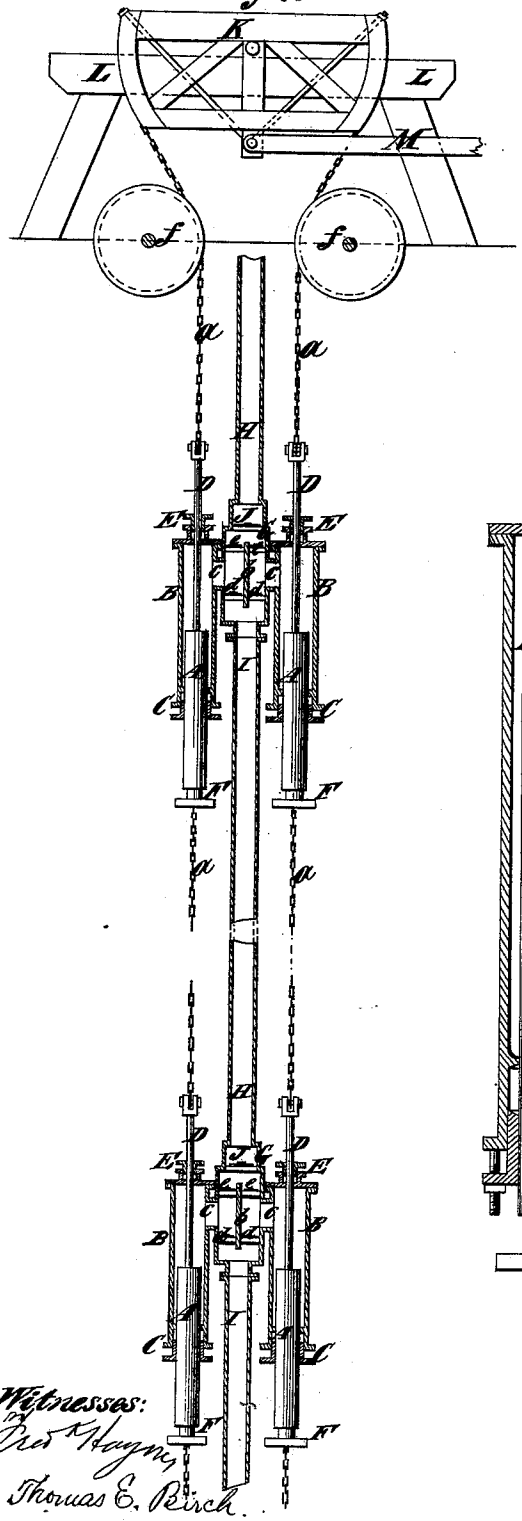
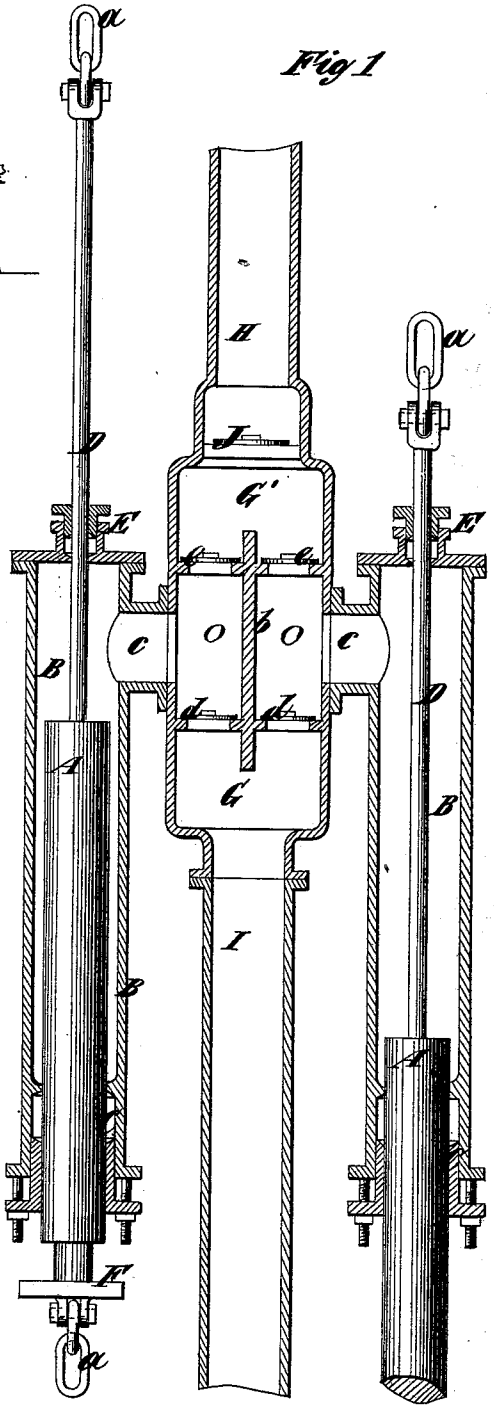


Fig 1



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN R. CUSHIER, OF BELLPORT, NEW YORK.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **222,250**, dated December 2, 1879; application filed August 11, 1879.

To all whom it may concern:

Be it known that I, JOHN R. CUSHIER, of Bellport, in the county of Suffolk and State of New York, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention is specially adapted for deep well or mining pumps; and its object is to produce a pump which may be used in place of the "Cornish" pumps usually employed for such purposes. Such Cornish pumps are furnished with a plunger, which is forced down by means of a heavy, and often very long, pump-rod, and as such pumps are usually single-acting the machinery employed to work them is subjected to very severe shocks, and serious breakages are of frequent occurrence.

My invention consists in the combination, with two single-acting cylinders and plungers, of a valve-chamber communicating with both said cylinders above said plungers, and arranged between said cylinders, and stuffing or packing boxes arranged at the lower ends of said cylinders, through which said plungers work.

It also consists in the combination, with two pumps arranged side by side, a suction and discharge valve for each pump, and a common discharge-pipe, of a pressure-valve arranged in said discharge-pipe, whereby the discharge-valves of each pump are relieved of the pressure in said discharge-pipe at the commencement of the stroke.

It also consists in details and combinations of parts hereinafter described.

In the accompanying drawings, Figure 1 represents a vertical section of a pair of pumps and a valve-chest therefor embodying my improvements, and Fig. 2 represents an arrangement of two pairs of such pumps and mechanism for operating the same.

Similar letters of reference designate corresponding parts in both figures.

A designates a pair of pump-plungers of equal area and length of stroke. Although it is not necessary that they should be exactly of equal area, I prefer that they should be so in order that one may balance the other. These plungers work in cylinders B, arranged side by side through stuffing-boxes C in the lower ends of said cylinders.

D designates piston-rods extending upward from the plungers and passing through stuffing-boxes E in the top heads of the pump-cylinders B.

The piston-rods D may have connected to them chains *a* or wire-rope connections, for imparting motion to the plungers from any suitable mechanism arranged above the pump, or for connecting together the plungers of two or more pairs of pumps, arranged one above the other, as represented in Fig. 2. Such an arrangement is particularly adapted for deep mines, where the water may be raised more advantageously by successive stages.

F designates cross-heads arranged upon the lower ends of the plungers A, and timbers may be so arranged in the well or shaft that if the connections *a* should give way the cross-head would be caught by the said timbers, and the plunger prevented from falling down the shaft.

The valve-chamber for my pumps is interposed between the two cylinders, and is divided by a partition, *b*, into two compartments, O O, each of which is in free communication with one of the cylinders B by means of a passage, *c*, and both compartments O communicate, through suction-valves *d*, with a compartment, G, which is in free communication with the common suction-pipe I, and, through discharge-valves *e*, with a compartment, G′, which is in communication with the common discharge-pipe H.

When in use the plungers of the pumps are intended to perform their work while pulled upward by means of ropes, chains, or other flexible connections attached to the lower cross-head or to the piston-rod D.

In the common discharge-pipe H, I have represented an extra discharge-valve or pressure-valve, J. The weight of the water in the discharge-pipe is supported by this valve, and the separate delivery-valves *e* are relieved of heavy pressure at the change of the stroke of the pumps, and consequently will work more quietly.

When the arrangement represented in Fig. 2 is employed the chains *a* or wire ropes are used to connect the plunger A of each pump with the piston-rod D of the pump next below it, and the piston-rods of the upper pair of

pumps are connected, by means of chains *a* passing around guide-pulleys *f*, or other flexible connections, with a walking-beam or T-bob, K, arranged at the mouth of the mine or shaft. This walking-beam or bob is supported in a frame-work, L, in such manner that it may be rocked or oscillated by means of power applied through the connecting-rod M, and thereby serves to impart a simultaneous reciprocating motion in reverse directions to the plungers of the pumps with which its two ends are connected. The weight of the several plungers and connections upon the two ends of the beam or bob K should be equal, and as they will balance each other in their ascent and descent, power is only necessary to raise the weight of water. This arrangement also renders the amount of power necessary to work the pumps uniform, thus preventing all violent shocks and lessening the breakages to the machinery.

In place of the walking-beam or bob I may employ a shaft extending across the mouth of the mine-shaft, and having upon it two cranks set at opposite points, and to which the two series of pump-plungers are connected by means of the chains *a*.

By my invention I provide a pump system in which, as the plungers are pulled upward instead of forced downward to their work, very light connections may be used, in which the work is very evenly distributed, so as not to subject the driving mechanism to any severe shocks, and in which the separate discharge-valves of each pump are relieved from the pressure of the water in the discharge-pipe by means of the pressure-valve common to both pumps.

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

1. The combination, with two single-acting cylinders and plungers, of a valve-chamber communicating with both said cylinders above said plungers, and arranged between said cylinders, and stuffing or packing boxes arranged at the lower ends of said cylinders, through which the said plungers work, substantially as specified.

2. The combination, with two pumps arranged side by side, a suction and discharge valve for each pump, and a common discharge-pipe, of a pressure-valve arranged in said discharge-pipe and common to both pumps, substantially as and for the purpose specified.

3. The combination of the twin single-acting pump-cylinders B B, the centrally-arranged valve-chamber, G, composed of two compartments, each containing suction and discharge valves *d e*, the common suction and discharge pipes H I, and the pressure-valve J, arranged in said discharge-pipe, substantially as specified.

J. R. CUSHIER.

Witnesses:
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