(No Model.)

B. V. NORDBERG.

STEAM PUMP.

No. 433,994. Patented Aug. 12, 1890.

Fig. 1.

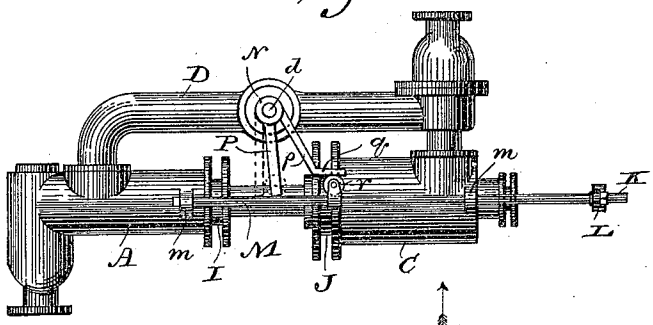


Fig. 2.

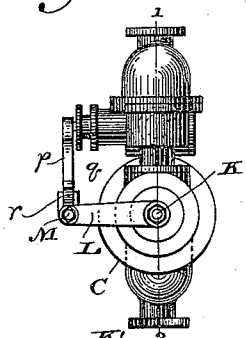


Fig. 3.

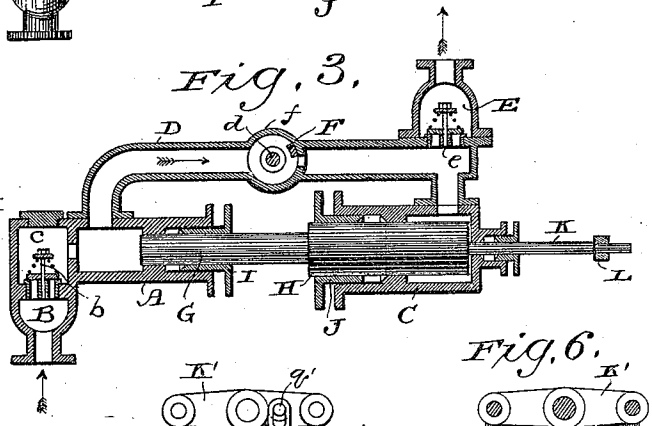


Fig. 4.

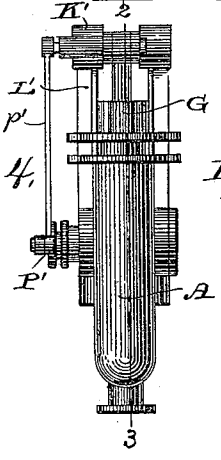


Fig. 5.

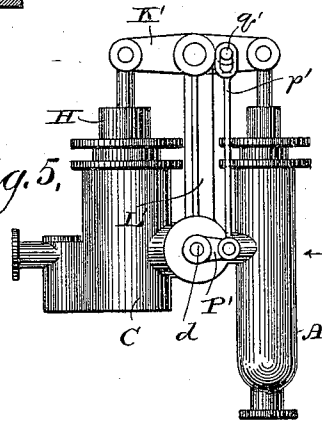
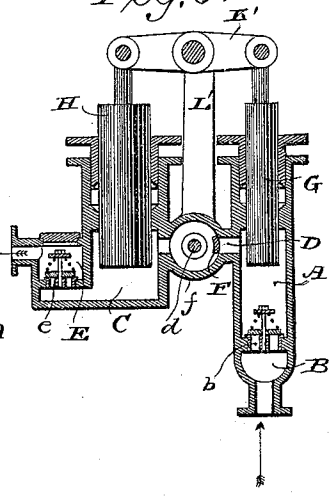


Fig. 6.



Witnesses
G. Albert Gouwey.
N. E. Oliphant

Inventor.
Bruno V. Nordberg
By Stout & Underwood
Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

BRUNO V. NORDBERG, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE BRUNO NORDBERG COMPANY, OF SAME PLACE.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 433,994, dated August 12, 1890.

Application filed January 13, 1888. Serial No. 260,630. (No model.)

To all whom it may concern:

Be it known that I, BRUNO V. NORDBERG, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Steam-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to steam-pumps and will be fully described hereinafter.

In the drawings, Figure 1 is a side elevation of my invention. Fig. 2 is an end view. Fig. 3 is a section on line 1 2, Fig. 2. Fig. 4 is an end view of a modification. Fig. 5 is a side view of the same; and Fig. 6, a section on line 2 3, Fig. 4.

A is a cylinder that is connected with the inlet-chamber B by an intermediate chamber *c* and a valve *b*, and this cylinder is connected to another larger cylinder C by a pipe D, which also connects both cylinders with the outlet-chamber E through a valve *e*. A rocking valve F is located in the chamber *f* of pipe D.

G H are plungers, one G working in cylinder A through a stuffing-box I and the other H working in the cylinder C through a stuffing-box J. The stem K of the plungers is controlled by a cross-head L and a rod M, that slides in lugs *m* on the side of the two cylinders. The stem *d* of valve F projects through a stuffing-box N in the pipe D, and has fixed on it two arms P *p*, one of which P extends down at right angles to the pipe D when the valve F is closed, and the other *p* extends at an acute angle to the pipe D, and this arm has a horizontal finger *q*. The lower ends of these arms P *p* hang in the path of a roller *r*, that is carried by rod M, so that when the parts are in the position shown in full lines, Fig. 1, the roller by lifting on finger *q* will cause arm *p* to open valve F, which valve will remain open until the forward stroke of the plunger carries roller *r* from beneath the finger *q* and causes it to strike arm P, and when this occurs the arm *p* will be carried to a vertical position and the valve closed.

The operation of my device is as follows: Imagine the valve F to be open. Now as the plungers advance from the position shown in Figs. 1 and 2 a vacuum will be created in chamber C and the fluid will be sucked from chamber B, through valve *b*, chamber *c*, cylinder A, pipe D, and valve F into chamber C, and displaced from cylinder A by plunger G until the arm P is struck by roller *r* and valve F closed thereby, and this occurs just as the plungers have finished their forward strokes. On the backward stroke, as the valve F is closed when the plungers start, the plunger H will force the fluid from the cylinder C by displacement into outlet-chamber E through valve *e*, and the retiring of plunger G from cylinder A will cause a vacuum in cylinder A and thus suck from chamber B until the roller *r* lifts arm *p* and thereby opens valve F, when the fluid will be expelled from the pump to the extent of the difference in area of plungers G and H.

In the modification shown in Figs. 4, 5, and 6 I use two cylinders A and C, differing in diameter from each other, and two corresponding plungers H and G, connected with each other by a walking-beam K′, which latter is trunnioned in standards L′. A short pipe D connects the cylinders A and C, and a valve-chamber *f* is situated in this pipe and contains a valve F, that is operated by the walking-beam K′ through a strap *p′*, one end of which is looped to a pin *q′* on the walking-beam K′, and the other end is wristed to a crank-arm P′ on the stem *d* of valve F.

In operation during the first part of the downward stroke of plunger H the valve F is closed, and there is no equilibrium. Therefore the pump has a forcing action, sucking water into cylinder A and expelling from cylinder C until the parts are in the position shown in Figs. 5 and 6, when the pin *q′*, acting on the loop of strap *p′*, will open valve F and establish equilibrium, which will exist until plunger H completes a downward stroke and plunger G an upward stroke and the plunger H has made an upward stroke and the plunger G a downward stroke, during which time the pump will take in and expel water in proportion to the difference in area of the two plungers, forcing action taking place only during that portion of the downward stroke of plunger H in which valve F is closed.

The times at which the valve F will be

opened and closed may be regulated by the adjustment of the roller r in Fig. 1 and by the shortening or lengthening of the strap p' in Fig. 5.

I do not propose to confine myself to any particular form of valve or connection between the two cylinders, as these may be varied indefinitely without departing from the spirit of my invention.

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

In a steam-pump, the combination, with two cylinders differing in diameter from each other, of two corresponding plungers, inlet and outlet valves, a pipe connecting the two cylinders, and a valve in said pipe, and means for automatically opening and closing said valve to open and close communication between the two cylinders at stated times in the stroke of the plungers, substantially as described,

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

BRUNO V. NORDBERG.

Witnesses:

CHARLES EDWARD SHADALL,

STANLEY S. STOUT.