N. W. CONDICT, Jr.

VALVE MECHANISM FOR PUMPING ENGINES.

No. 194,223. Patented Aug. 14, 1877.

FIG. 1.

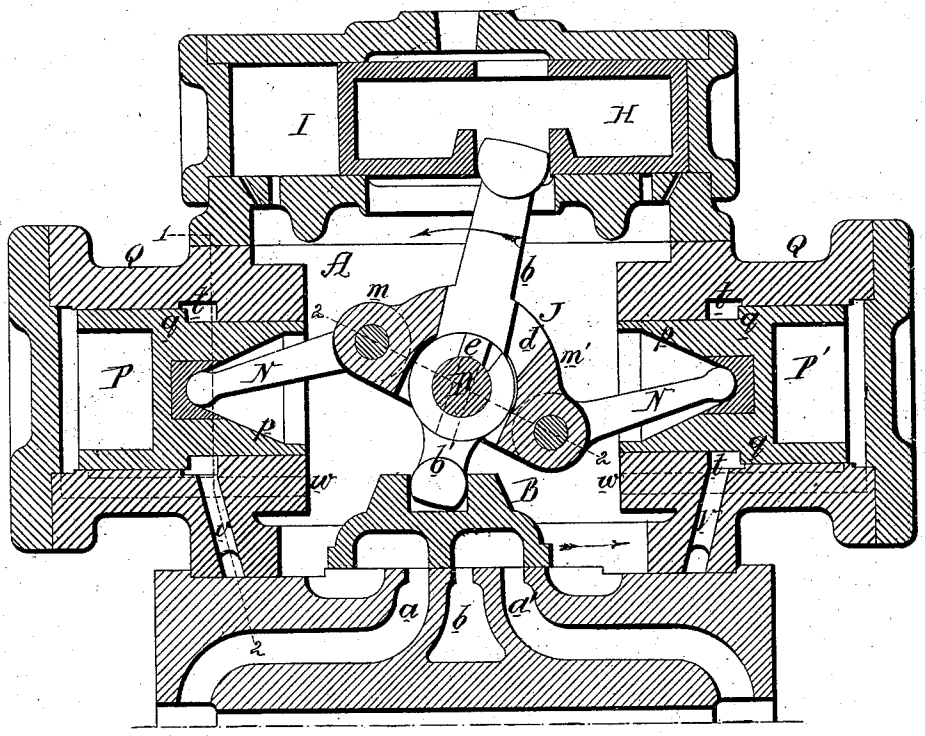
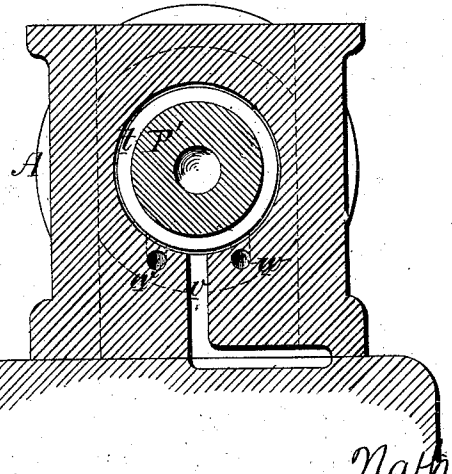


FIG. 2.



Witnesses,

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NATHAN W. CONDICT, JR., OF JERSEY CITY, NEW JERSEY.

IMPROVEMENT IN VALVE MECHANISMS FOR PUMPING-ENGINES.

Specification forming part of Letters Patent No. **194,223**, dated August 14, 1877; application filed February 9, 1877.

To all whom it may concern:

Be it known that I, NATHAN W. CONDICT, Jr., of Jersey City, New Jersey, have invented certain Improvements in Valve Mechanism for Pumping-Engines, of which the following is a specification:

My invention relates to an improvement, fully described hereinafter, in the valve-operating mechanism of which Letters Patent No. 142,292 were granted August 26, 1873, to Dudley S. Steele and myself as assignees of William J. Stevens.

In the accompanying drawing, Figure 1 is a vertical section of part of a cylinder and steam-chest of a direct-acting pumping-engine illustrating my improvement; and Fig. 2, a transverse section on the line 1 2.

A is a steam-chest, containing a valve, B, adapted to steam-ports *a* and *a'* and exhaust-port *b* of the steam-cylinder, in a manner common to steam-pumps, and to the pump described in the aforesaid Letters Patent.

A rock-shaft, *d*, passes through one or both sides of, and has its bearings in, the steam-chest, and this shaft derives its motion from the piston-rod of the engine through the medium of a lever secured to the said shaft, and situated on the outside of the chest.

To the shaft D is loosely hung a lever, the long arm *b* of which projects into a slot in the hollow piston H of a supplementary steam-cylinder, I, referred to hereinafter, the short arm *b'* of the lever being adapted to a recess in the valve B. A pin, *e*, on the shaft D projects into an enlarged slot in the hub of the said lever, so that the latter and the valve B do not depend upon the piston-rod of the engine for their entire movement, but only for the first part of each movement—a feature which is also fully described in the aforesaid Patent No. 142,292. Another lever, J, is hung loosely to the shaft D, and to one arm, *m*, of this lever is jointed a rod, N, the outer spherical end of which is adapted to a bearing in the piston P, a similar rod, N', extending from the other arm, *m'*, of the lever to a bearing in the piston P'.

Each of these pistons P and P' is adapted to a cylinder, Q, formed on or attached to the steam-chest, and there is a direct communication through a passage, *w*, (shown by dotted lines in Fig. 1,) between the interior of the steam-chest and the space at the outer end of each piston in each cylinder.

The inner portion *p* of each piston is reduced in diameter, so as to present an annular surface, *q*, within a chamber, *t*, which is always in communication through a passage, *v*, with the exhaust-passage of the engine; hence there will always be a pressure of steam against the outer end of each of these pistons in excess of the pressure against their inner ends.

It will be seen that the arm *b* of the above-mentioned lever passes through a slot, *d*, in the lever J, so that the said lever is permitted to have a limited movement independent of the arm, against which, as shown in Fig. 1, one end of the slot bears, the valve in this figure having been so moved as to expose the steam-port *a*. When the arm *b* is moved by the engine in the direction of the arrow, it will carry with it the valve B and the lever J, and consequently push the pistons P and P' outward in contrary directions, until a line drawn through the center of both pistons coincides with a line, 2 2, drawn through the center of the pins which connect the rods N to the said lever J, when the further outward movement of the pistons will cease.

A slight continued movement of the lever J beyond the last-described position will place the said lever entirely under the control of the two pistons P and P', which, under the pressure of steam, will suddenly complete the movement of the valve B in the direction of the arrow, and the port *a'* will consequently be exposed.

It will be seen, without further description, that the steam-cylinders Q, with their pistons, perform the same duty as the springs described in the aforesaid Patent No. 142,292. The duty, however, is performed much more effectually and gently than by the springs, which are liable to rapid deterioration.

The piston H, which moves simultaneously with the valve B, operates against a cushion of steam at and near the termination of each movement of the valve, so as to lessen the shock which would otherwise result from the

sudden completion of the valve's movements. This feature also appears and is claimed in the aforesaid patent.

I claim as my invention—

The combination, in a direct-action pumping-engine, of a slide-valve, B, rock-shaft D, pistons P and P′, actuated by the pressure of steam and devices, whereby the primary movement of the said shaft, in either direction, is imparted from a moving part of the machine, and is continued and completed by the pressure of steam through the medium of the said pistons, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NATHAN W. CONDICT, JR.

Witnesses:

GEO. G. STEELE,

D. S. STEELE.