J. E. WATSON.

BALANCED SLIDE VALVE.

No. 178,393. Patented June 6, 1876.

Fig. 1

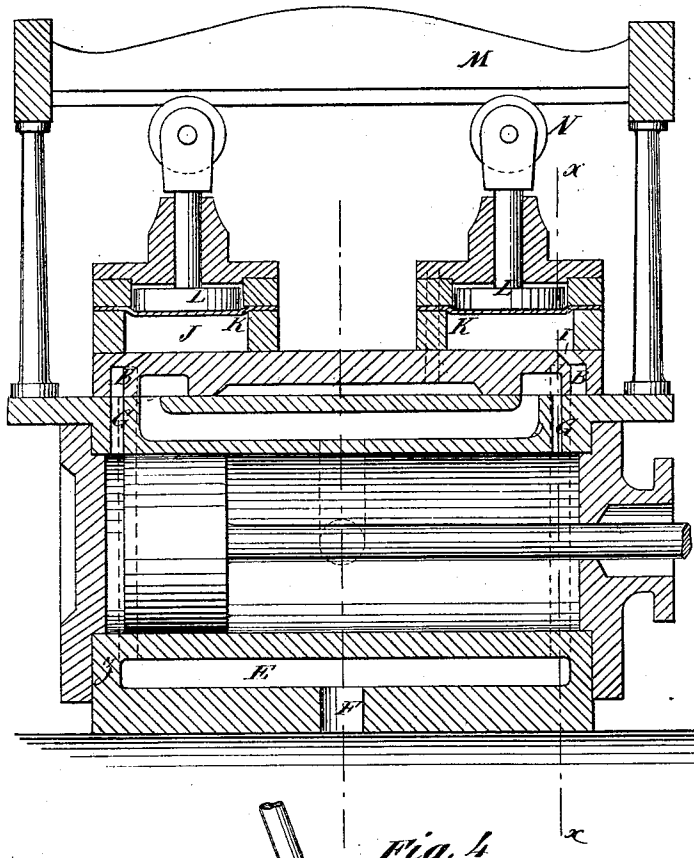


Fig. 2

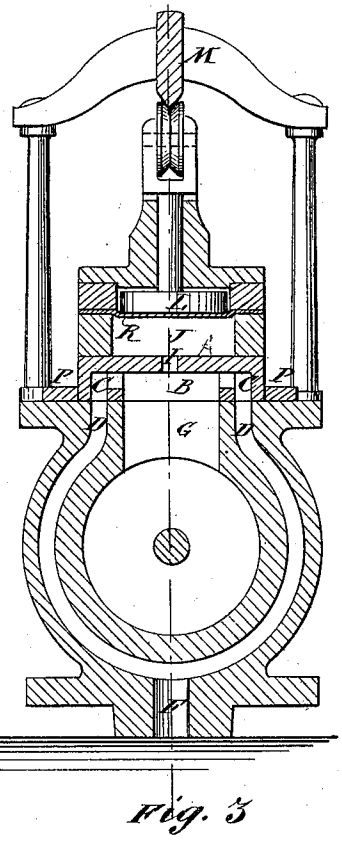


Fig. 3

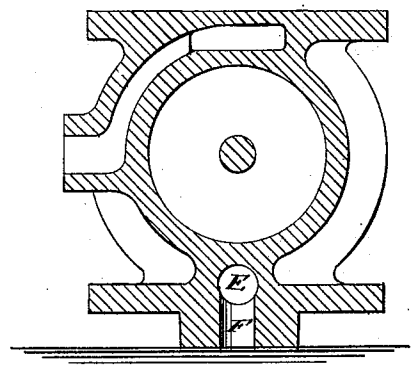


Fig. 4

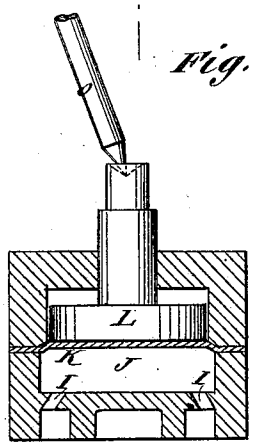
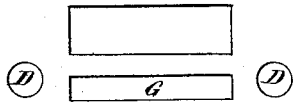


Fig. 5



WITNESSES:

C. Neveux

John Goethals

INVENTOR:

John E. Watson

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN EDWARD WATSON, OF LOUISVILLE, KENTUCKY.

IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. **178,393**, dated June 6, 1876; application filed April 18, 1876.

To all whom it may concern:

Be it known that I, JOHN E. WATSON, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and Improved Balanced Slide-Valve, of which the following is a specification:

The invention consists in the improvement of balanced slide-valves, by combining a piston, diaphragm, and valve with a seat having port, passages, and channels leading from steam-inlet, substantially as hereinafter described.

The piston-rod may travel forward and backward under the support above it by a roller in its upper end, or by a vibrating rod bearing on or pivoted to its upper end, and also bearing against the support above the center of the course traveled by the valve.

The former arrangement is the one best adapted for a steam-engine, and the latter is preferred for a steam-pump.

Figure 1 is a longitudinal sectional elevation of an engine constructed according to my invention, taken on the line *y y*, Fig. 2. Fig. 2 is a transverse section on the line *x x* of Fig. 1. Fig. 3 is a section on line *z z*, and Fig. 4 is a detail section of the modification adapted for steam-pumps. Fig. 5 is a plan of the ports in the valve-seat.

Similar letters of reference indicate corresponding parts.

A is the valve, in which the live-steam ports B extend only a short distance upward from the bottom, and which receive the steam from passages C, to which it is supplied through the valve-seat by the passages D, which, in this example, are cored around the cylinder to the chamber E, which the steam enters at F. From port B there is a passage, I, admitting steam into the chamber J, in which is a diaphragm, K, of thin copper or other flexible metal, and above which is the piston L, the rod of which bears against the support M by a roller, N, or a vibrating rod, O. This diaphragm takes the upward pressure of the steam, and has sufficient movement to allow the valve to be pressed by the down pressure in said chamber steam-tight on the seat, and the area of the chamber is sufficiently larger than that on the under side of the valve subject to lifting pressure to keep the valve tight. The valve works between raised ribs P, which keep it from working out of place laterally, and it works without a steam-chest, which is not needed in consequence of receiving the steam through the seat below, on which it works.

When a single valve is used, it will have two inlets to the chamber J, as in Fig. 4, instead of one, as in the double valve.

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

The combination of piston L, diaphragm K, and valve A with seat, having port B, steam-passages C C, and steam-channels leading from inlet F, all arranged substantially as and for the purpose specified.

JOHN EDWARD WATSON.

Witnesses:

T. B. MOSHER,

ALEX. F. ROBERTS.