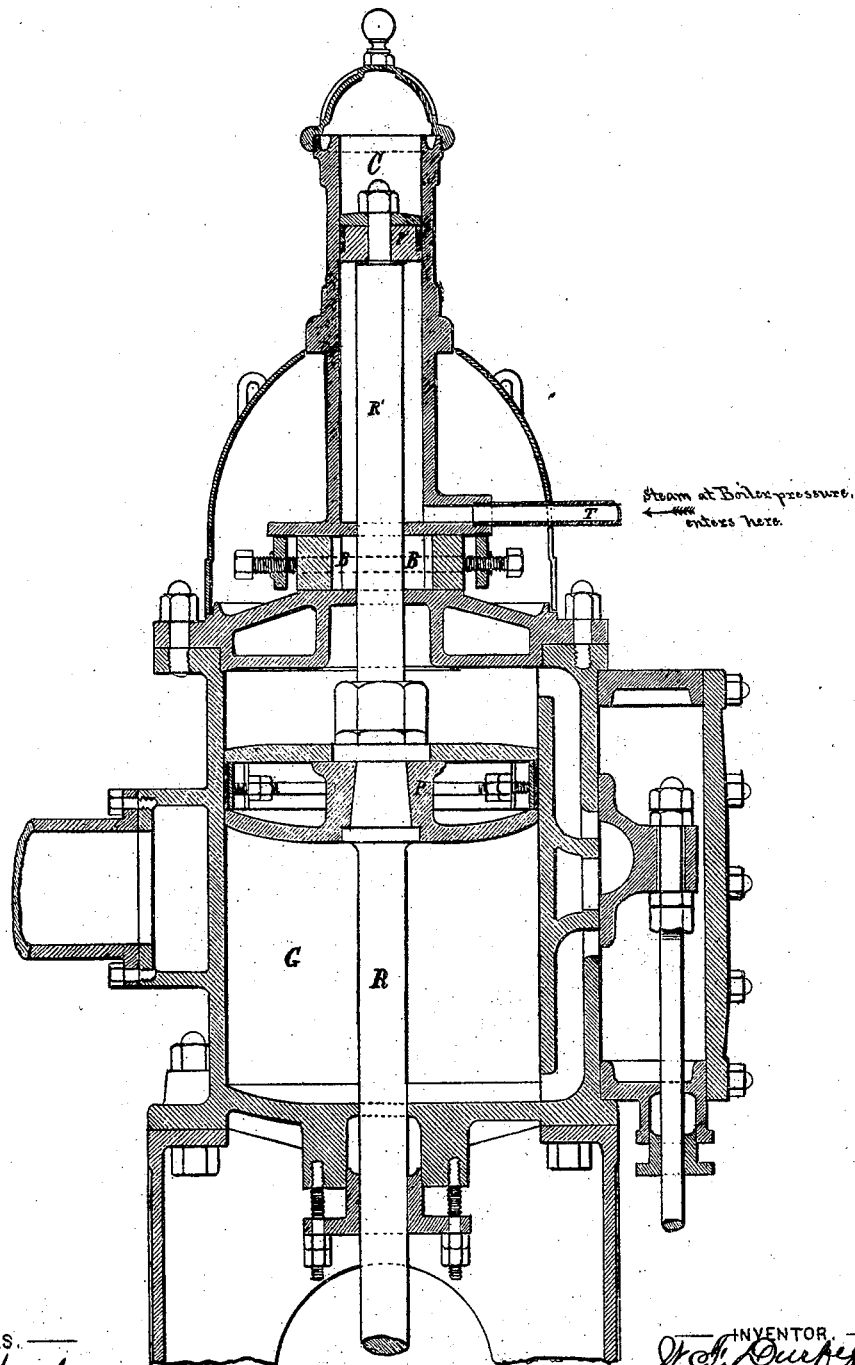


W. F. Durfee,

Reciprocating Engine.

No. 112,792.

Patented Mar. 21, 1871.



WITNESSES.

L. S. Hoabee
Alex. F. Roberts

SECTION THROUGH CENTRE OF CYLINDER.

INVENTOR

W. F. Durfee
per Wm Munn & Co
Attorneys

United States Patent Office.

WILLIAM F. DURFEE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO HIMSELF AND JACKSON & WILEY, OF DETROIT, MICHIGAN.

Letters Patent No. 112,792, dated March 21, 1871.

IMPROVEMENT IN BALANCING VERTICAL-RECIPROCATING MASSES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WILLIAM F. DURFEE, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in System of Balancing Vertical-reciprocating Masses; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

The drawing represents a vertical central section of a vertical steam-engine, showing my improvement applied.

My invention relates to and consists in a new way of balancing the pistons of vertical steam-engines, pump-rods in mines, the top roll of rolling-mills, the saws of saw-mills, and other vertically-reciprocating masses.

The principle of my invention consists in balancing the weight of a vertically-movable mass of matter by a piston connected therewith, and receiving a continuous supply of steam at boiler-pressure upon its lower side, the said steam raising the movable weight on the upward stroke, and offering an equal amount of resistance thereto on the downward stroke.

I will now describe a vertically-working piston, as illustrative of and fully exemplifying my new idea or plan.

G in the drawing represents the main cylinder of an upright steam-engine:

P, the piston; and

R, the piston-rod.

R' is the upper part of the piston-rod, having the same cross-sectional area as the part R;

P', an auxiliary piston;

C, the chamber, in which the latter travels; and

T, a pipe, connecting with the steam-boiler.

B is a stuffing-box, between the two piston-cylinders C G, to prevent steam from passing from one to the other along the piston-rod.

The mode of operation is as follows:

The cylinder C (through the pipe T) receives steam at boiler-pressure, which acts upon the under surface of the piston P'. This under surface is so proportioned in its area that the force of steam is exactly (or enough so for all practical purposes) equal to the weight of the reciprocating mass; thus, on the upward stroke it entirely lifts this mass, and on the downward stroke antagonizes it, offering a resistance equal to the gravity thereof. In this manner the weight of all the moving parts is completely neutralized, while on the down stroke the steam is also returned, without waste, to the boiler.

Having thus described all that is necessary to a full understanding of my invention,

What I esteem to be new, and desire to secure by Letters Patent, is—

A piston, P', and cylinder C, combined, as described, with a pipe, T, receiving steam at boiler-pressure, for the purpose of neutralizing vertically-movable masses of matter, as described.

Witnesses:

WILLIAM F. DURFEE.

M. DIAMOND,

R. P. CHAPMAN.