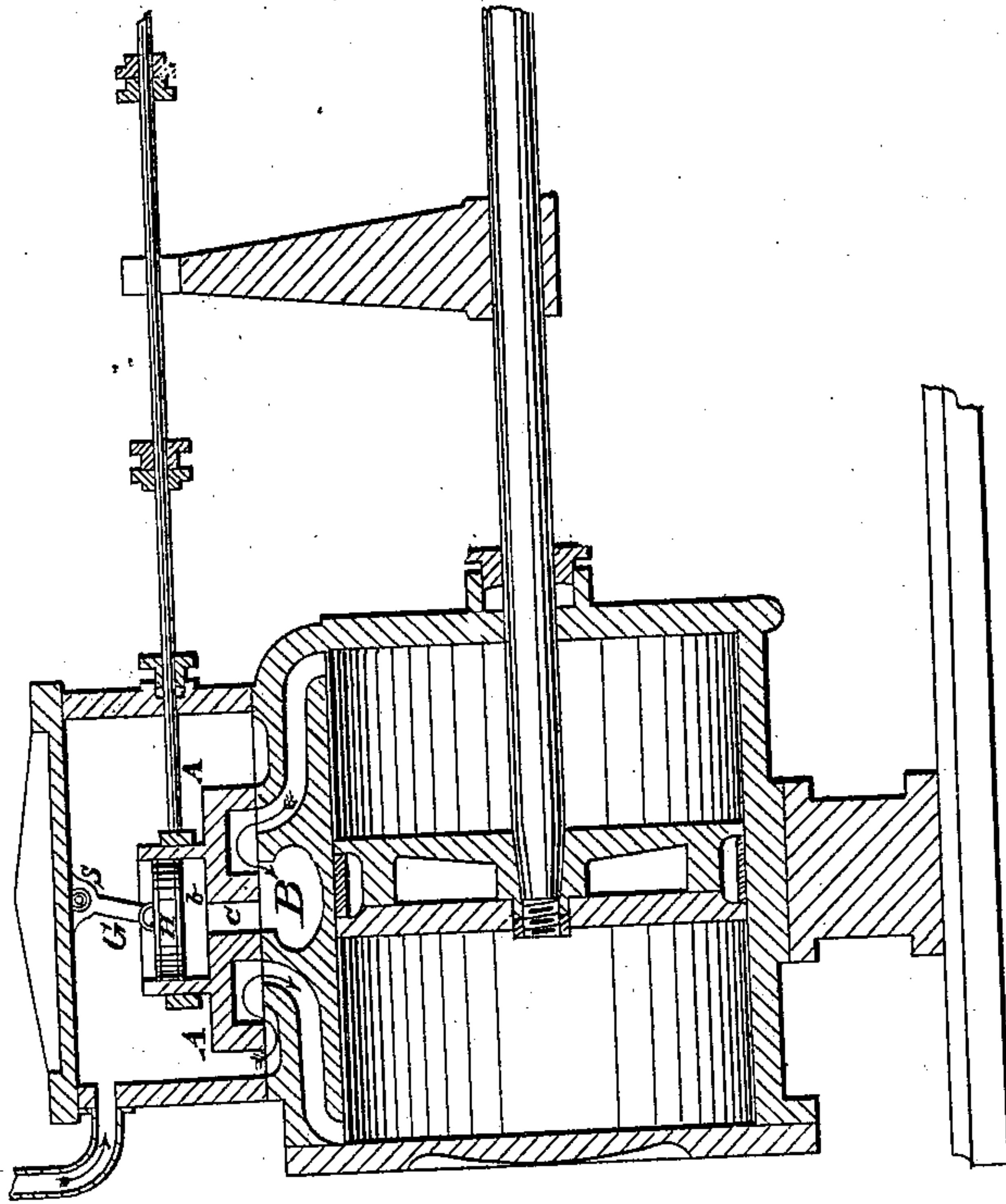
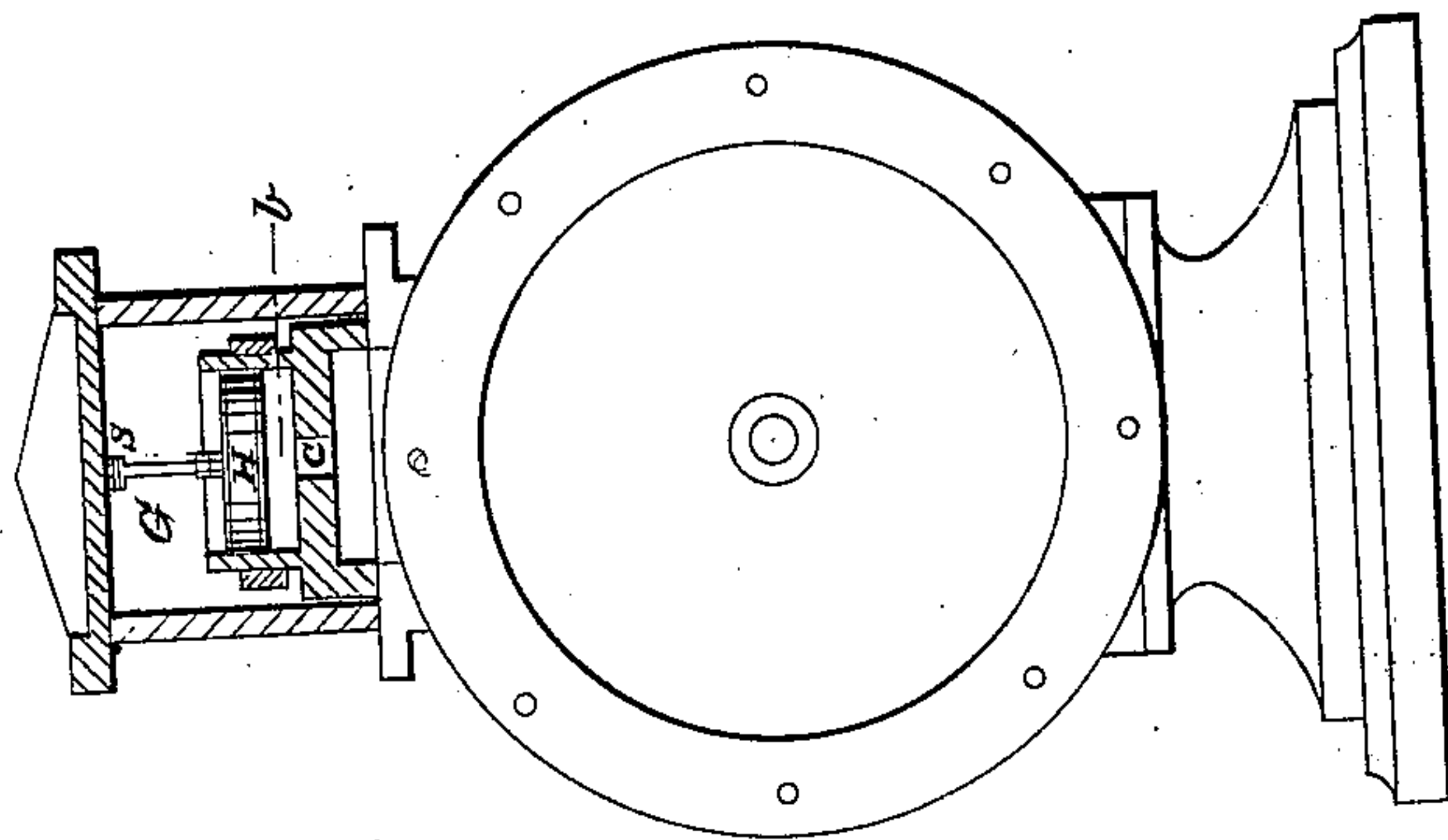


*H. R. Worthington,*  
*Steam Balanced Valve.*  
*No 15,400.* *Patented July 22, 1856.*

*Fig. 1*



*Fig. 2*



# UNITED STATES PATENT OFFICE.

HENRY R. WORTHINGTON, OF NEW YORK, N. Y.

## RELIEVING STEAM SLIDE-VALVES FROM PRESSURE.

Specification of Letters Patent No. 15,400, dated July 22, 1856.

*To all whom it may concern:*

Be it known that I, HENRY R. WORTHINGTON, of the city of Brooklyn, county of Kings, and State of New York, have invented a Method of Removing Pressure from the backs of Steam Slide-Valves, and that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

It is shown as applied to that variety of engine called "direct acting" in which the motion of the valve is produced by a tappet motion. The piston rod and valve rod are broken off as the remaining parts of a steam engine are not necessary to the illustration of my invention.

Figure 1 is a vertical and longitudinal section through the middle of a steam cylinder. Fig. 2 is a vertical and transverse section through the same.

The same letters refer to the same parts of the machine in both figures.

In the usual ways of alleviating the pressure of steam upon slide valves, by means of a piston, the tendency of the piston is to lift or draw the valve from its seat in an upward direction. In my arrangement, this lifting tendency is entirely obviated, the whole effect of the piston being to transfer a part of the pressure which would otherwise be superincumbent, to a point of support where there is but little motion or friction. It may be thus described. A slide valve A, working over ports or openings in the usual manner, is made with two exhaust ports or cavities instead of one, as in the ordinary D-valve. The steam from the boiler passes into and out of the cylinder from the steam chest in the direction shown by the arrows. An opening or passage (C) through the middle of the valve A is in constant communication with the exhaust open-

ing B. This passage C communicates with the small cylinder *b*, formed on the upper side of the slide valve. Into this small cylinder a piston H is properly fitted and packed. This piston is attached by a swinging link or bar G to the steam chest cover at S or to any other convenient and permanent point of support. A pivot joint connects the bar G at one end to the piston H, and a similar attachment is made to the point of support at the other end, thus allowing the piston H to move easily back and forth in accordance with the motion of the steam valve. The under side of said piston is therefore always in communication with the exhaust, while the upper side is as constantly exposed to the full pressure of the steam within the steam chest. The pressure thus made upon the area of the piston H is so much taken from the back of the steam valve A, and transferred by means of the swinging bar G to the point of support S, where the motion and consequently the friction is much reduced. The gain is therefore in this reduction of friction due a given amount of pressure, when received upon a point where there is but little motion, compared with that produced by the same pressure made upon the face of the valve, when the motion is greater.

Having thus described my invention, and the means whereby I carry the same into useful operation, what I claim as new therein and desire to secure by Letters Patent is—

The transferring of steam pressure from the back of a steam slide valve to a fixed point, by means of a piston and vibrating link, substantially as herein described, and for the purpose herein set forth.

HENRY R. WORTHINGTON.

In presence of—

WM. A. PERRY,  
CHAS. C. BARTON.