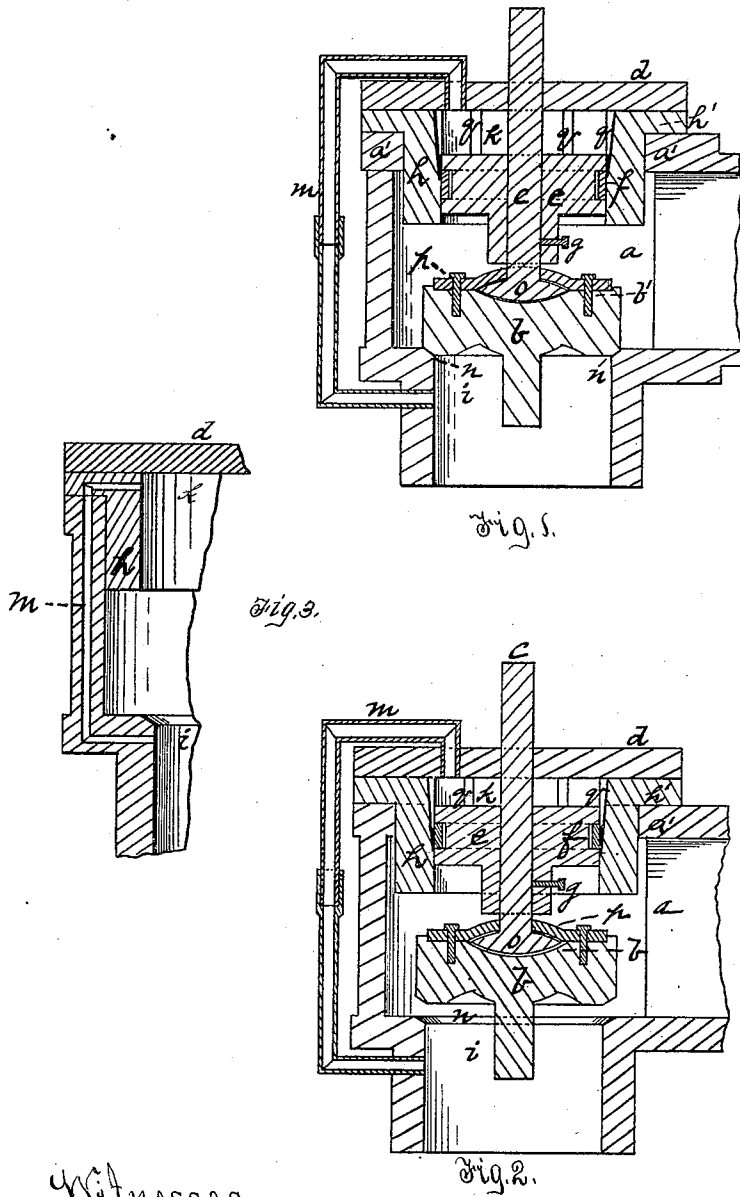


(No Model.)

G. W. MOORE & J. W. PERTZ.  
Balanced Valve.

No. 234,602.

Patented Nov. 16, 1880.



Witnesses.  
*Aly. Scott*  
*R. K. Evans*

Inventors  
*George W. Moore*  
*John W. Pertz*  
by his attys  
*Barkwell & Co.*

# UNITED STATES PATENT OFFICE.

GEORGE W. MOORE AND JOHN W. PERTZ, OF PITTSBURG, PENNSYLVANIA.

## BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 234,602, dated November 16, 1880.

Application filed August 26, 1880. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE W. MOORE and JOHN W. PERTZ, both of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Balanced Valves; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical section of our improvement with the valve closed. Fig. 2 is a like view of the same with the valve open; and Fig. 3 is a sectional view of a modified form.

Like letters of reference indicate like parts. The usual construction of balance puppet-valves has been that of two disks of unequal area connected to a common stem and provided with two valve-seats, so as to utilize the difference in pressure; but such construction was objectionable, first, because the strain caused by the steam acting against the disks in opposite directions frequently sprung the stem and caused the valves to leak and cut out; secondly, because of the excessive width of the steamways required to accommodate the two valve-disks; thirdly, because the valve was only approximately a balance-valve, the pressure due to the difference in the areas of the two disks having to be provided for. These objections have been more or less completely overcome in other constructions of valves, but such valves require alteration or special construction of the steam-chest or steamway of existing single or non-balanced puppet-valves.

In a valve patented to us on July 1, 1879, No. 217,019, we strove to remedy these various objections; but that valve is not fitted for use where the steam-pipe leads directly down from the steam-chest into the cylinder or other place, or drops directly down to any considerable extent, as there is then nothing for the supporting-stem of the valve-shield to rest upon.

Our present invention has for its object the balancing of the ordinary unbalanced or single valves now in use without alteration or special construction of the valve or steam-chest, and of providing for the certain seating of the valve in case of the springing of the valve-stem or steam-chest; and to this end it consists, first,

of a piston mounted on the stem and working in a bushing or collar placed under the cap of the valve-chamber; and, second, in details of construction.

To enable others skilled in the art to make and use our invention, we will now describe its construction and use.

The steam-chest *a* is of usual construction. The valve *b* is an ordinary single or unbalanced puppet-valve, having a stem, *c*, which passes up through the cap *d* in the usual manner.

On the stem *c* we place a piston, *e*, having a steam-packing, *f*, secured adjustably to the stem by a screw, *g*, or in other suitable manner. We then place in the top of the steam-chest *a* a flanged collar or bushing, *h*, securing it by placing the flange *h'* on the edge *a'* of the chest and bolting the cap *d* down upon it. The piston *e* works in the bushing *h*, as in a cylinder.

Extending around the outside, from the steam-pipe *i* to the chamber *k*, which is formed above the piston *e*, is a pipe, *m*, the function of which will hereinafter be explained.

The valve-seat is shown at *n*, the valve *b* being beveled correspondingly. The valve is fastened to the stem loosely enough to permit a slight movement or oscillation by means of a button or disk, *o*, secured in the chambered upper face, *b'*, of the valve by the convex cap *p* bolted thereon. The disk *o*, being smaller in size than its chamber, permits a slight rocking or oscillation of the valve *b*, the purpose of which is to cause it to be seated properly in case of the springing of the stem.

The operation of our improved valve is as follows: The steam being in the chest *a*, presses down upon the valve *b* and up against the piston *e*, and as these are nearly of the same size, but little power is necessary to raise the valve. As soon as the valve begins to rise off of its seat *n* and the steam enters the steam-pipe *i* a portion passes instantly through pipe *m* into the chamber *k*, equalizing the pressure and balancing the valve. The steam in chamber *k* also cushions the piston *e*, and is exhausted through the pipe *m*.

The bushing *h* is grooved internally, as at *q*, from the top downward, preferably as far as the upper edge of the packing-ring *f* when

the piston is at the lower limit of its stroke. The functions of the grooves are:

5 First, to permit the passage of steam from the steam-chest into the chamber *k*, and so to equalize the pressure on both sides of the piston. In this respect it may be used as a substitute for pipe *m*.

10 Second, to cause the water of condensation (which is warm while the valve is in use) to flow down from the chamber *k* and lubricate the piston.

15 Third, to drain the chamber of water when the engine is stopped, to prevent freezing. This is done by blocking up the valve and letting the water drain through the grooves *q* past the packing *f*.

20 In case the steam-chest is not high enough for the application of the piston, the requisite height can be obtained by increasing the thickness of the flange *h'*. The construction of the devices for securing the valve to the stem may be varied without departing from our invention.

25 It is apparent that our improved construction is applicable to existing single valves with but little change and at small expense. With the exception of the mode of fastening the valve to the stem and the attachment of the pipe *m*, no change of any of the existing parts is necessary. In case of new valves the passage *m* may be cast in the side of the steam-chest, as shown in Fig. 3.

30 The advantage of preventing the springing of the stem affecting the seating of the valve is very great, as it prevents leakage and cutting of the valve and seat.

Our improved valve is cheap and simple in construction.

Our invention is applicable to globe and other

valves, and may be used for air and liquids as well as steam. 40

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A balance-valve consisting of the ordinary disk-valve and a piston mounted adjustably on the stem above the valve and moving in a bushing or cylinder placed and secured in the upper part of the steam-chest by a flange bolted between the cap and the upper edge of the steam-chest, substantially as and for the purposes described. 45 50

2. The combination of a valve secured loosely to its stem, a piston mounted adjustably on said stem receiving the reverse pressure of the steam, and a bushing or cylinder, in which said piston moves, substantially as and for the purposes described. 55

3. A balance-valve, consisting of a single valve having a piston on its stem working in a cylinder in the steam-box, in combination with a grooved cylinder or bushing which will permit the steam to pass through the grooves around the piston on its upward stroke to balance the same and drain the cylinder, substantially as and for the purposes described. 60 65

4. The combination of balance-valve, grooved bushing or cylinder, and steam port or pipe extending from below the valve to the cylinder above the upper valve or piston, substantially as and for the purposes described. 70

In testimony whereof we have hereunto set our hands.

GEORGE W. MOORE.  
JOHN WM. PERTZ.

Witnesses:  
T. B. KERR,  
JAMES H. PORTE.