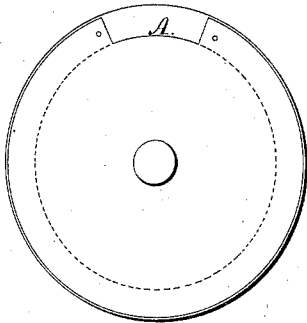


*B. H. Brown,*  
*Steam Balanced Valve.*

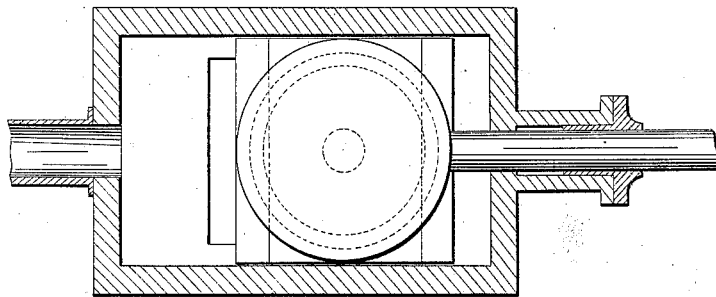
*N<sup>o</sup> 3,241.*

*Patented Sep. 1, 1843.*

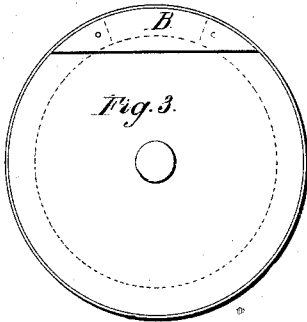
*Fig. 2.*



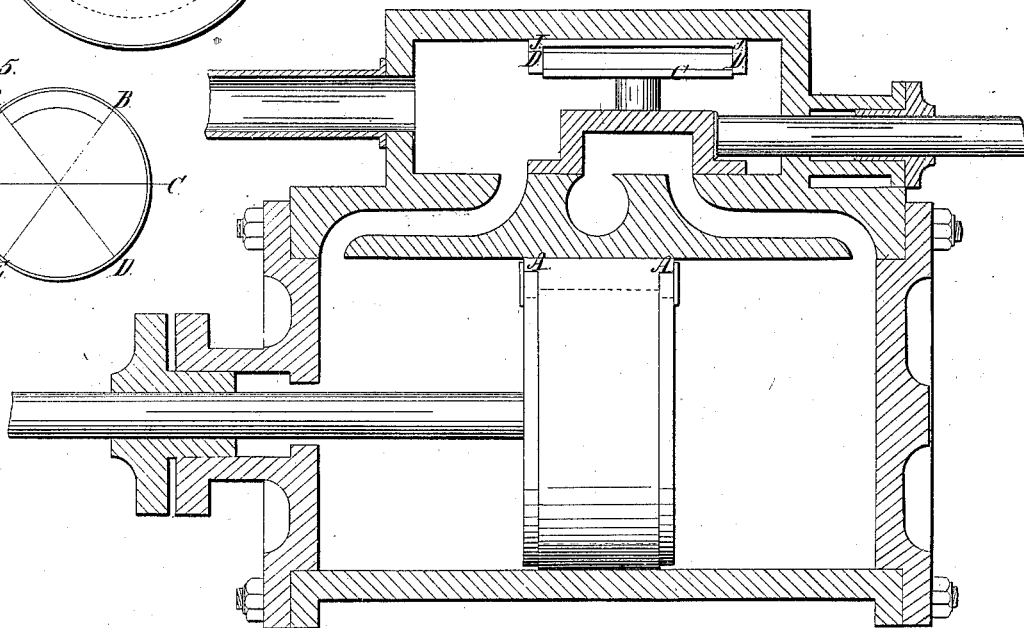
*Fig. 4.*



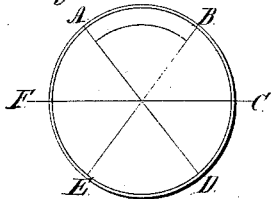
*Fig. 3.*



*Fig. 1.*



*Fig. 5.*



# UNITED STATES PATENT OFFICE.

BENJN. H. BROWN, OF PHILADELPHIA, PENNSYLVANIA.

## PISTON AND SLIDE-VALVE OF HORIZONTAL STEAM-ENGINES.

Specification of Letters Patent No. 3,241, dated September 1, 1843.

*To all whom it may concern:*

Be it known that I, BENJAMIN H. BROWN, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in the Manner of Constructing Pistons and Slide-Valves in Horizontal Steam-Engines; and I do hereby declare that the following is a clear, full, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1, represents a section through the center of the cylinder and steam chest showing the piston and valve. Fig. 2 is an end view of the piston showing the packing extended out to the face of the rim or follower. Fig. 3, is an end view of the piston showing the plate which confines the packing over the rim to its proper place, and Fig. 4, is a plan of the slide valve.

The nature of my improvement in the piston consists in extending the packing on the piston over as much of the surface of the rim of the followers on the top, as the pressure of the steam, if allowed to act upon that surface, would equal the weight of the piston, as shown at A, Fig. 1 and Fig. 2. And in fitting in my slide valve, a cap D, Fig. 1, packed steam tight on the balance C, which cap being pressed upwards by the force of the steam upon the rim of the cap keeps it tight against the top of the steam chest.

To enable others skilled in the art to make and use my improvements I will proceed to describe their construction and operation.

I take any of the pistons as at present constructed and cut out from the top of the rim of the followers at the ends of the piston, a space of the same depth as that already made for the packing, as at A, Fig. 2, and with a surface which shall contain as many superficial inches as the pressure of the steam in the cylinder on a superficial inch shall give a pressure equal to the weight of the piston, I extend the packing into the space thus cut out of the rim of the followers, the same as on the other part of the piston, and secure it in its place by a plate B, Fig. 3, fastened by screws or otherwise to the followers of the piston. Now the steam pressing equally in every direction, it presses equally in the space between the cylinder and the rim of the follower, and the

pressure upward is equal to the pressure downward, consequently no effective power is produced to raise the weight of the piston and of course it rests on the bottom of the cylinder, but by extending the packing through a certain portion of the rim of the followers, at the top, out to the face of the followers, you destroy the pressure of the steam downwards to whatever extent you may require, consequently you have a pressure acting upwards equal to the amount packed off at the top. Thus in Fig. 5, from A to B the packing, as I extend it through a portion of the rim of the followers, prevents the action of the steam downward—from B to C and from A to F the pressure of the steam downward is destroyed by the upward pressure from D to C and from E to F, leaving the pressure from D to E to act upward, or as I apply it, to raise the weight of the piston.

In the slide valve, as shown in Fig. 1, C is the balance commonly so called, but which by it wearing away unequally on the seat and on the top of the steam chest and the liability to expand and contract unequally, it allows the steam to get between its top surface and the top of the steam chest and destroy its effect, to prevent which I use the cap D, Fig. 1, which I fit and pack over the balance C so as to be steam tight, and the rim of the cap I make with such a surface, that the pressure of the steam against it, keeps the cap constantly against the top of the steam chest. I also leave sufficient space between the top of the balance C and the inner surface of the cap D to allow for whatever wearing away and expansion or contraction may take place in the metal of the valve or balance (as shown at J, Fig. 1). By these means the even action of the cap D is maintained against the top of the steam chest.

What I claim as my improvements and desire to secure by Letters Patent, is—

1. The applying the steam in the cylinders of horizontal steam engines to raise or counteract the weight of the piston by packing off more of the top surface of the piston than the bottom which I style the self counterpoised piston.

2. And a self adjusting cap in balance slide valves which being fitted and packed steam tight over the balance is kept against the top of the steam chest, by the pressure

of the steam, in the steam chest, on the rim  
of the cap, or by a spring between the top  
of the balance and the inner surface of the  
cap, thereby compensating for the wearing  
5 away, by friction and the contraction and  
expansion of the metals and preventing the  
steam from acting on the top of the cap

and destroying the balance, which I style  
a movable self adjusting cap.

Philadelphia 2nd June 1843.

B. H. BROWN.

Witnesses:

B. B. BOYCE,  
J. SNIDER.