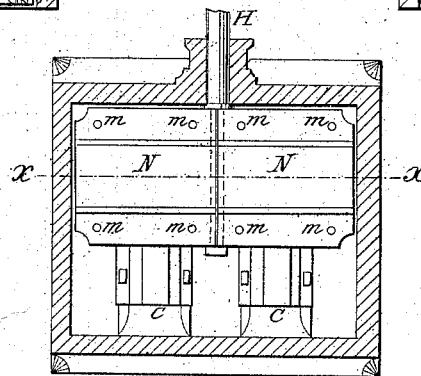
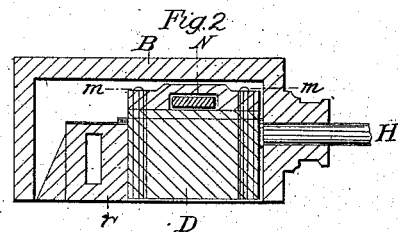
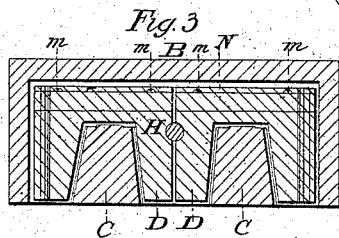
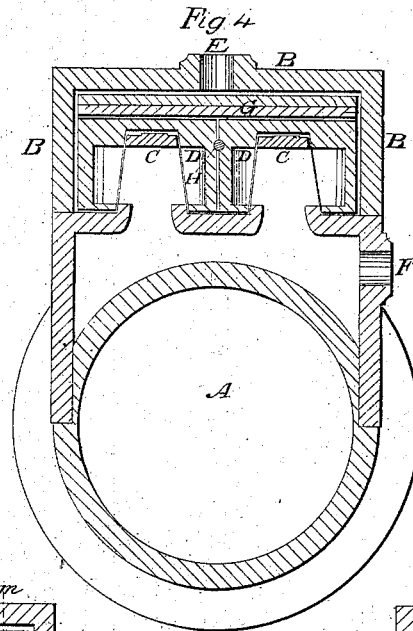


*J. A. Woodbury,*

*Steam Balanced Valve.*

*N<sup>o</sup> 48,611.*

*Patented July 4, 1865.*



*Witnesses*  
*A. Ames*  
*H. F. Shaw*

*Inventor*  
*James A. Woodbury*

# UNITED STATES PATENT OFFICE.

JAMES A. WOODBURY, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN SLIDE-VALVES.

Specification forming part of Letters Patent No. **48,611**, dated July 4, 1865.

*To all whom it may concern:*

Be it known that I, JAMES A. WOODBURY, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Balanced Slide-Valves for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan of the valves and ports, the top of the steam-chest being removed. Fig. 2 is a side elevation, and Fig. 3 is an end elevation, of the same, the steam-chest being cut away for the purpose of inspection; and Fig. 4 is a transverse section through the steam chest and cylinder in the line *x x* of Fig. 1.

Like parts are indicated by the same letters in all the drawings.

My present invention is intended more particularly as an improvement on the improvement in slide-valves for steam-engines for which Letters Patent of the United States were granted to me June 21, 1864; and it consists in making the valves *D D* of the vertical ports independent of each other and with a space between them, so that they may freely expand between the vertical walls *C C* of the ports without binding or sticking between them, thereby removing the only practical objection to the above-mentioned patented valves or to any others that may be constructed on a somewhat similar plan.

To enable others skilled in the art to make and use my improvement, I will now proceed to describe the construction and operation of the same.

Those parts which are clearly set forth in my patent of June 21, 1864, I will not now describe in detail, but simply state that *A* is the cylinder, *B* is the steam-chest, *E* is the pipe which conducts the steam from the boiler into the steam-chest, *F* is the exhaust-pipe, and *C C* are the vertical walls of the ports.

In my patent of June 21, 1864, the valves (which slide on the two vertical walls *C C* of the ports) consist of a single continuous piece of metal, which, when the steam is first let on to them, expanding more rapidly than the said

walls *C C*, become, or are liable to become, immovably wedged between them. I therefore make two independent valves, *D D*, in place of the single one before employed, leaving, as represented in Figs. 1, 3, and 4, a space between them which will allow them to expand laterally without binding upon the walls *C C*. The two valves *D D* are united by means of the bar *G*, which is placed across the center of the top of the same in a corresponding groove in the under side of the top pieces, *N N*, which latter are confined to the valves by means of the screws *m*, as clearly shown in Figs. 1, 2, and 3. The bar *G* fits loosely in the slots in the top pieces, *N N*, so that the valves *D D* are free to expand or contract laterally between the walls *C C*, while at the same time they are kept in the proper relative position. The valve-rod *H* passes between the valves *D D*, as represented in the drawings, a semicircular slot being made in each of them to receive it. The valve-rod is turned smaller where it passes through the valves, so as to form shoulders, as represented by the dotted lines in Fig. 1; or, in place of these shoulders, large washers may be put on the valve-rod, each side of the valves, thereby rendering the latter more durable and more steady in their motion.

The two valves, united as I have described, are moved precisely as though they were made of a single, as they are in my former patent, alluded to above, while the very serious objection to the same is entirely removed.

Having thus described the construction and operation of my improvement, what I claim as new, and desire to secure by Letters Patent, is—

1. Constructing the valves *D D* independently of each other and with a space between them, so that they may be free to expand or contract between the vertical parallel port-walls *C C*, substantially as and for the purpose described.

2. Connecting the valves *D D* by means of the bar *G*, or its equivalent, substantially as and for the purpose described.

JAMES A. WOODBURY.

Witnesses:

N. AMES,

H. F. SHAW.