

Harley & Fendrick,

Balanced Valve.

No. 112,451.

Patented Mar. 7. 1871.

Fig. 1.

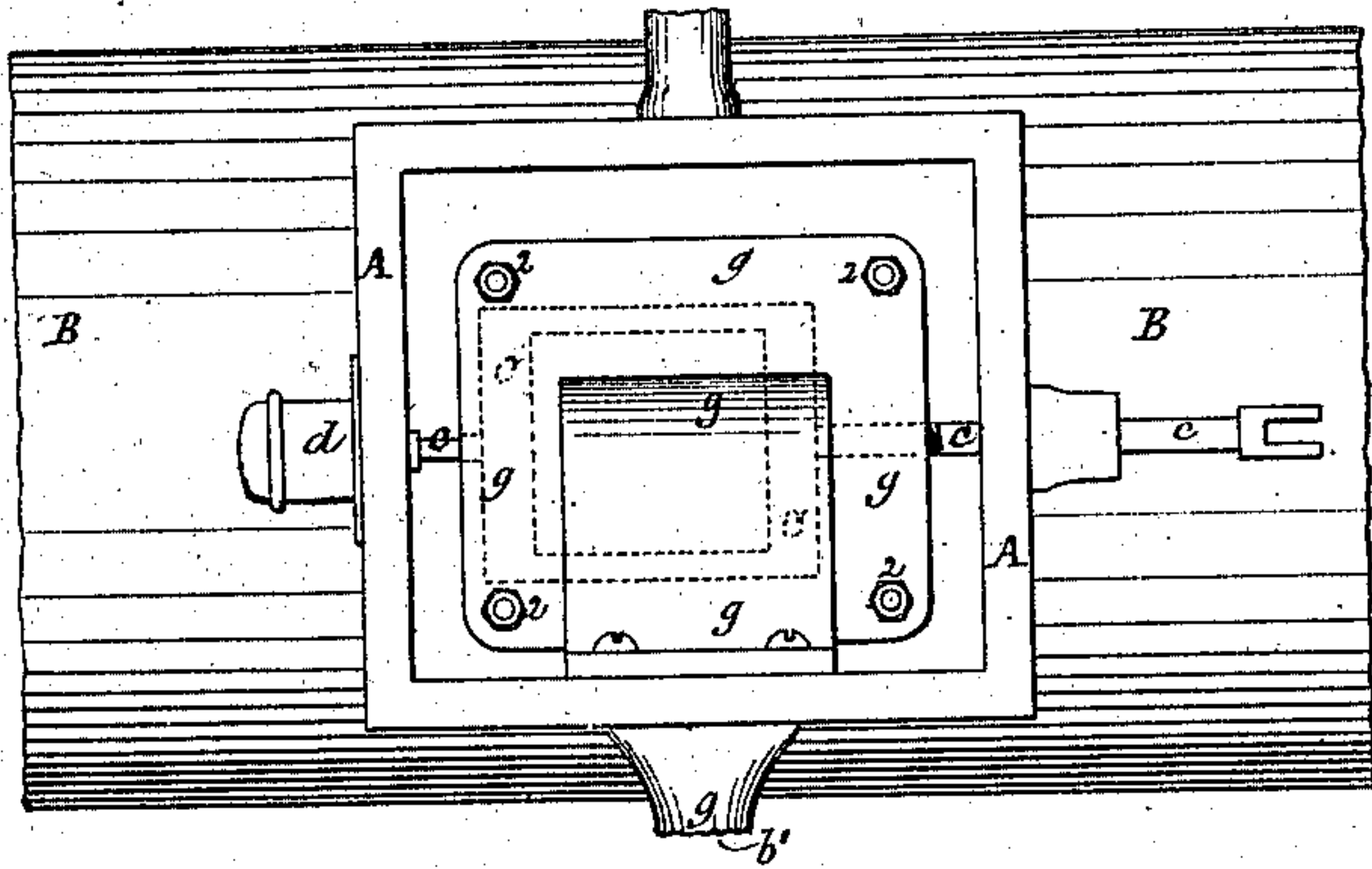


Fig. 2.

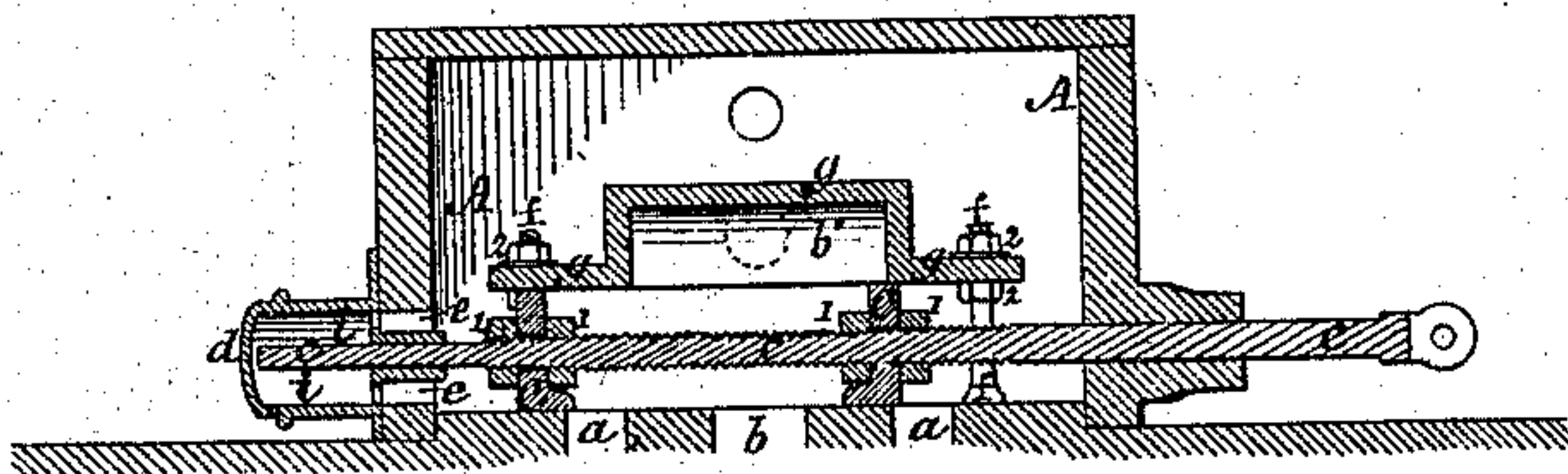


Fig. 3.

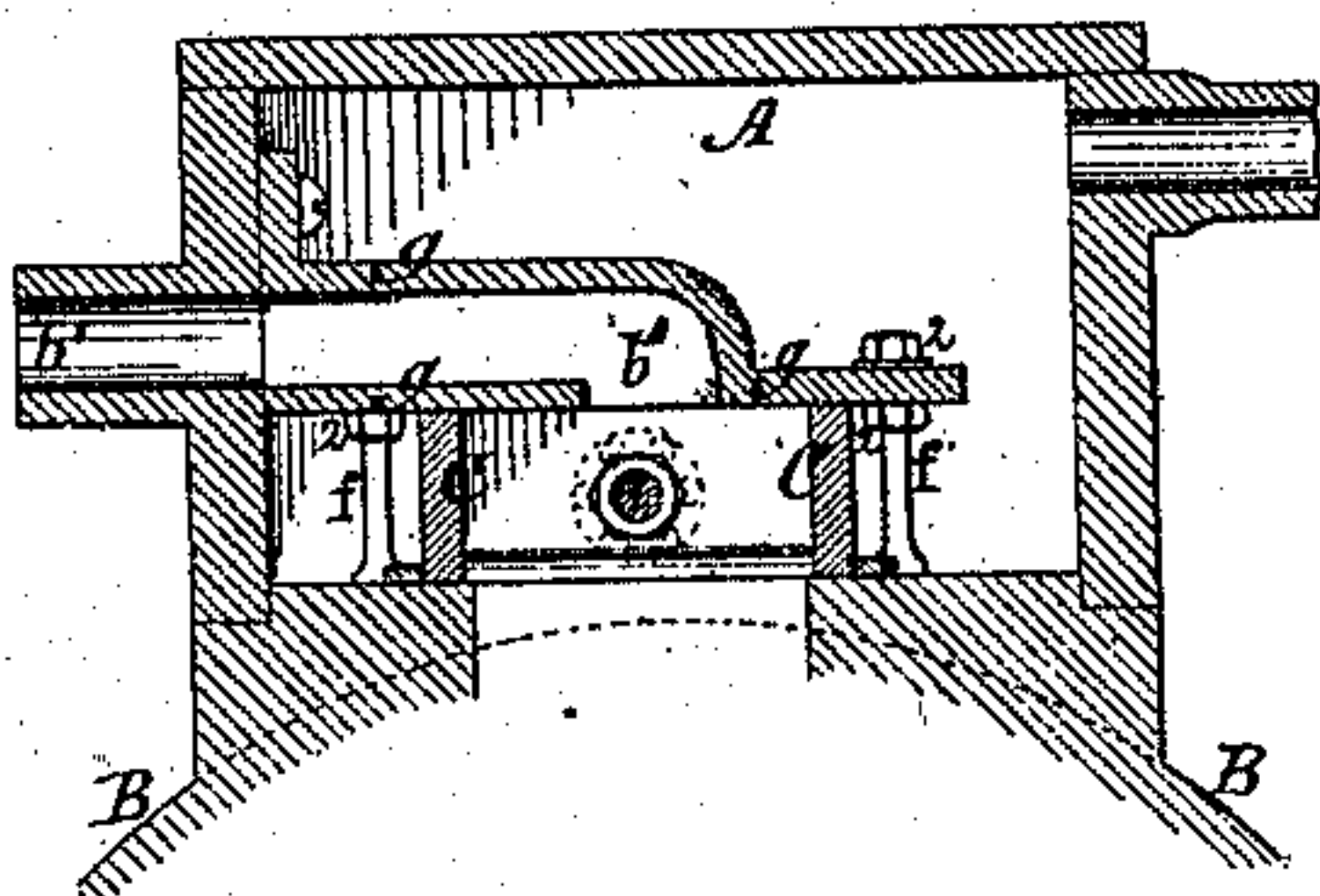


Fig. 4.

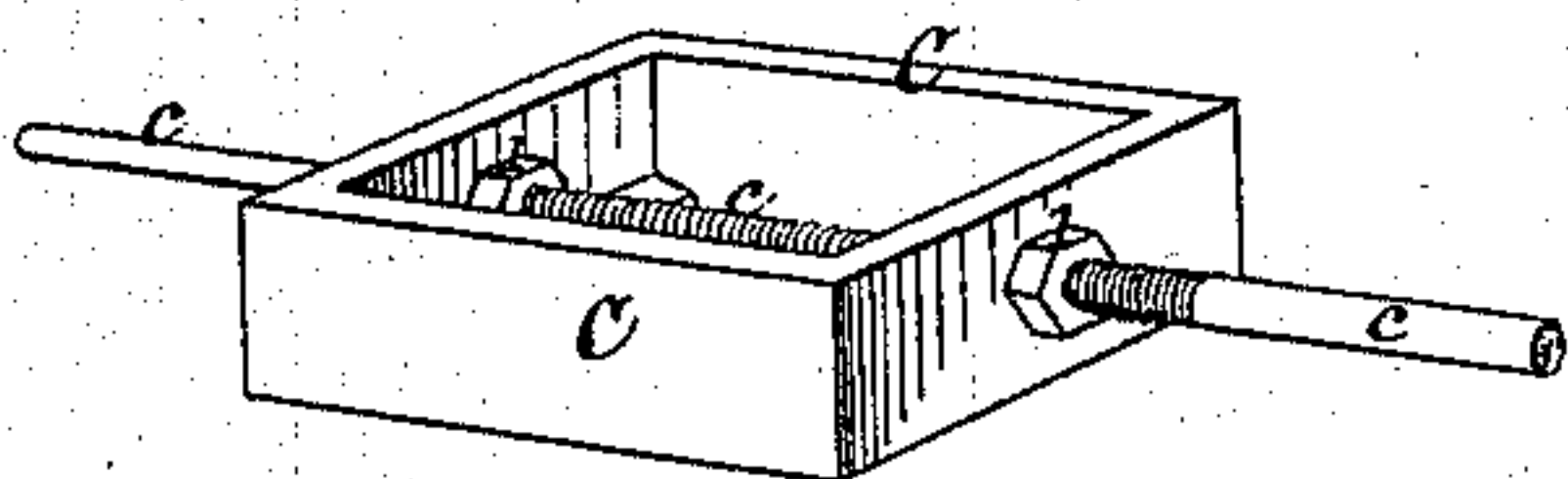
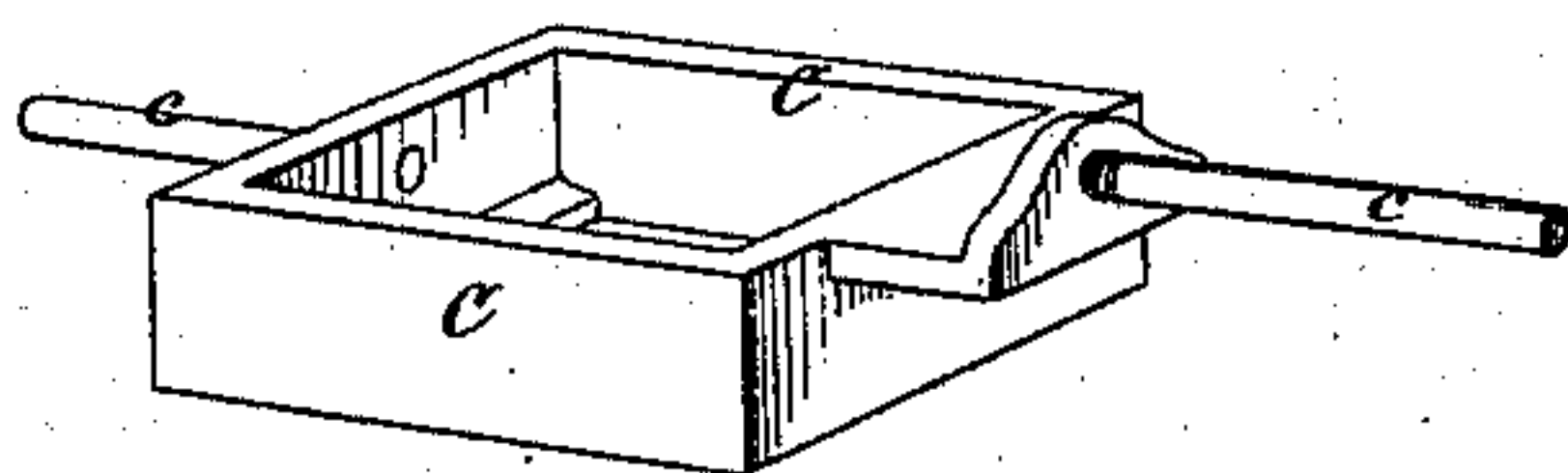


Fig. 5.



Witnesses.

M. H. Doolittle  
Edmund Masson.

Joseph L. Harley & Walter Fendrick.  
By their Attorney A. B. Stoughton.



# UNITED STATES PATENT OFFICE.

JOSEPH L. HARLEY, OF BALTIMORE, MARYLAND, AND XAVER FENDRICH,  
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## IMPROVEMENT IN VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **112,451**, dated March 7, 1871.

*To all whom it may concern:*

Be it known that we, JOSEPH L. HARLEY, of Baltimore, in the county of Baltimore and State of Maryland, and XAVER FENDRICH, of Georgetown, in the District of Columbia, have invented certain new and useful Improvements in Valves for Steam-Engines; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a top plan of the steam-chest arranged upon the steam-cylinder and the valve in said chest. Fig. 2 represents a longitudinal vertical section through the steam-chest and slide-valve therein. Fig. 3 represents a vertical transverse section through the same. Fig. 4 represents a perspective view of the valve removed from the steam-chest, and Fig. 5 represents a modification thereof.

Similar letters of reference, where they occur in the several separate drawings, denote like parts in all of the figures.

Our invention relates, first, to allowing the end of the valve-rod to play in a steam chamber, *i*, communicating with the steam-chest, so that the pressure shall be equal upon it at all times; second, to an inside jacket with the exhaust-port passing through it and out of the bottom or ends of the steam-chest, and also to protect the valve from the pressure of the "live steam" upon its outer side and of the exhaust-steam from its inner side; third, to the exhausting of the steam through either the cylinder or through the chest, or through both at the same time, and so preventing its pressure upon the inside of the valve.

To enable others skilled in the art to make and use our invention, we will proceed to describe the same with reference to the drawings.

The steam-chest A may be arranged upon the cylinder B in any of the usual well-known ways. Within the chest A the valve C is arranged so as to be moved over or past the inlet-ports *a a* to close and disclose them. The exhaust-opening is at *b*, and the exhaust may pass out through the cylinder or through the steam-chest, as will be explained.

The valve C, as more distinctly seen in Figs. 4 and 5, is of rectangular form and open both at its top and bottom. The valve stem or rod

*c*, I prefer to unite with the valve, as shown in Fig. 4—that is, to pass entirely through the valve—and the valve may be adjusted thereto by means of the set-nuts 1 1, this being the more reliable fastening; but the valve-rod may be cut or divided and united to the valve, as seen in Fig. 5, if that plan be preferred. One end of the valve-rod extends through a packed joint or stuffing-box to the exterior, so as to be connected to the device by which it and the valve is to be worked. The other end of the valve-rod passes through the chest and into a shield, *d*, into which the steam in the chest may freely pass through openings *e*, and thus the pressure of the steam will be always uniform on that end of the rod.

Upon columns or supports *f f* inside of the chest C' is placed a jacket, *g*, which can be adjusted and then firmly held upon said supports by the set-nuts 2 2. The exhaust-passage may be made through this jacket and into the escape-pipe by means of the passage *b'* extending through the side of the chest; or a similarly-closed passage may connect with the exhaust-port and the exhaust-steam carried or conducted away through it, said closed passage going through the cylinder B or under the chest A; or both of these plans of exhausting may be used at the same time. The steam may enter the chest through the pipe *h*, and, passing around the jacket *g* and to the port that is open, pass into the cylinder. The exhaust-steam passes out at *b*, and may go thence through the open valve C and into or through the passage *b'* and out at the side of the chest, or out of the top, if so preferred; or it may go from *b* underneath the chest or through the cylinder, as above explained.

It is alleged for this construction and arrangement that the valve is always balanced, the pressure of the live-steam on its exterior and of the exhaust-steam on its interior being uniform or constant and equal at all times.

Having thus fully described our invention, what we claim therein as new, and desire to secure by Letters Patent, is—

1. In combination with the valve-rod, the shield *d* and steam-chamber *i* therein, communicating with the steam in the chest, as and for the purpose described.

2. In combination with the valve open at



top and bottom, the jacket *g* and exhaust-passage *b'* through it, as and for the purpose described and represented.

3. The combination of the chest, valve, and inlet-ports with the exhaust-port *b*, when the latter is connected with the exhaust-passage *b'* or with a passage underneath the chest or through the cylinder, so as to use one or both

exhaust-passages at the same time, substantially as described.

JOS. L. HARLEY.  
XAVIER FENDRICH.

Witnesses:

A. B. STOUGHTON,  
EDMUND MASSON.