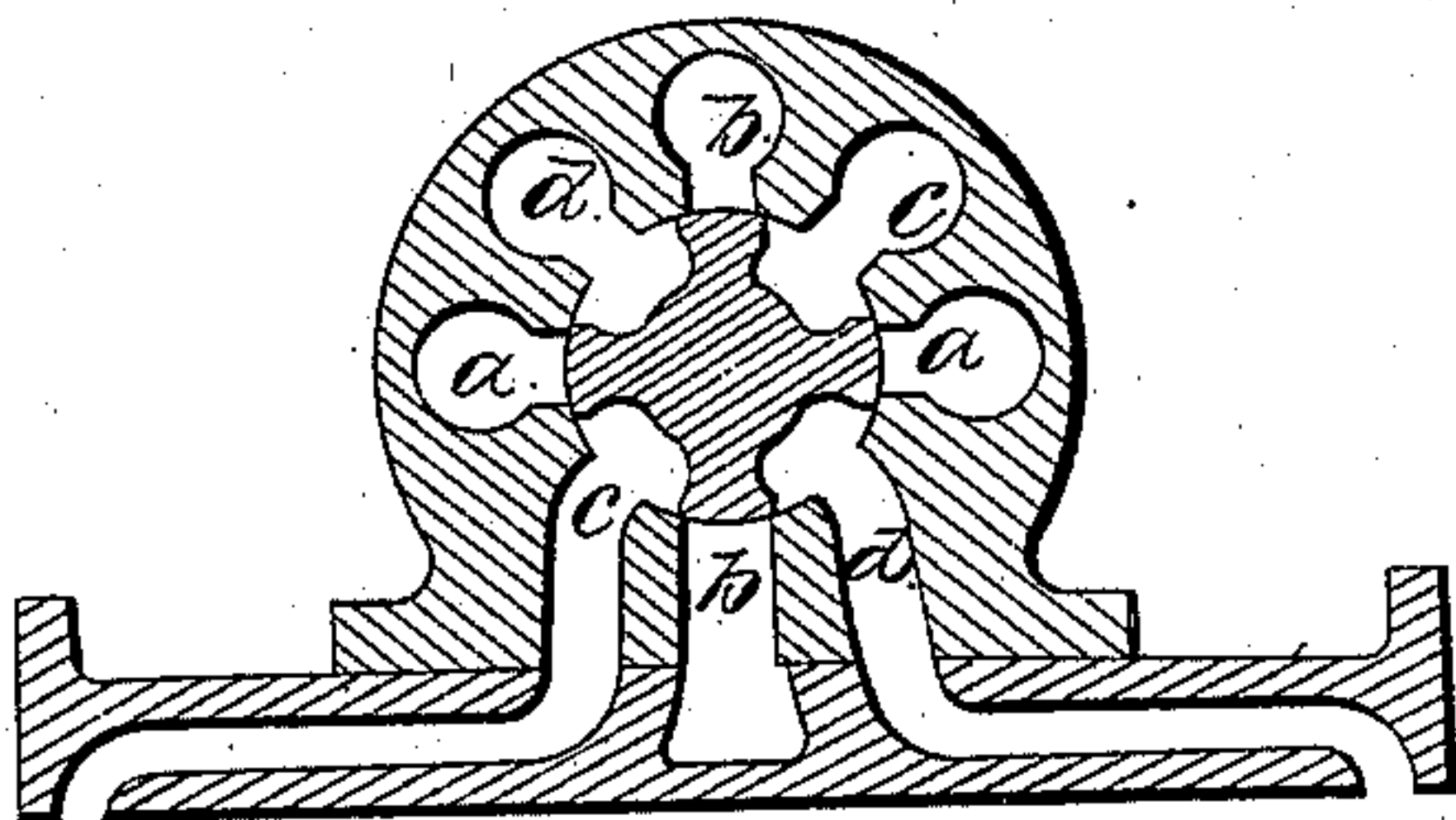
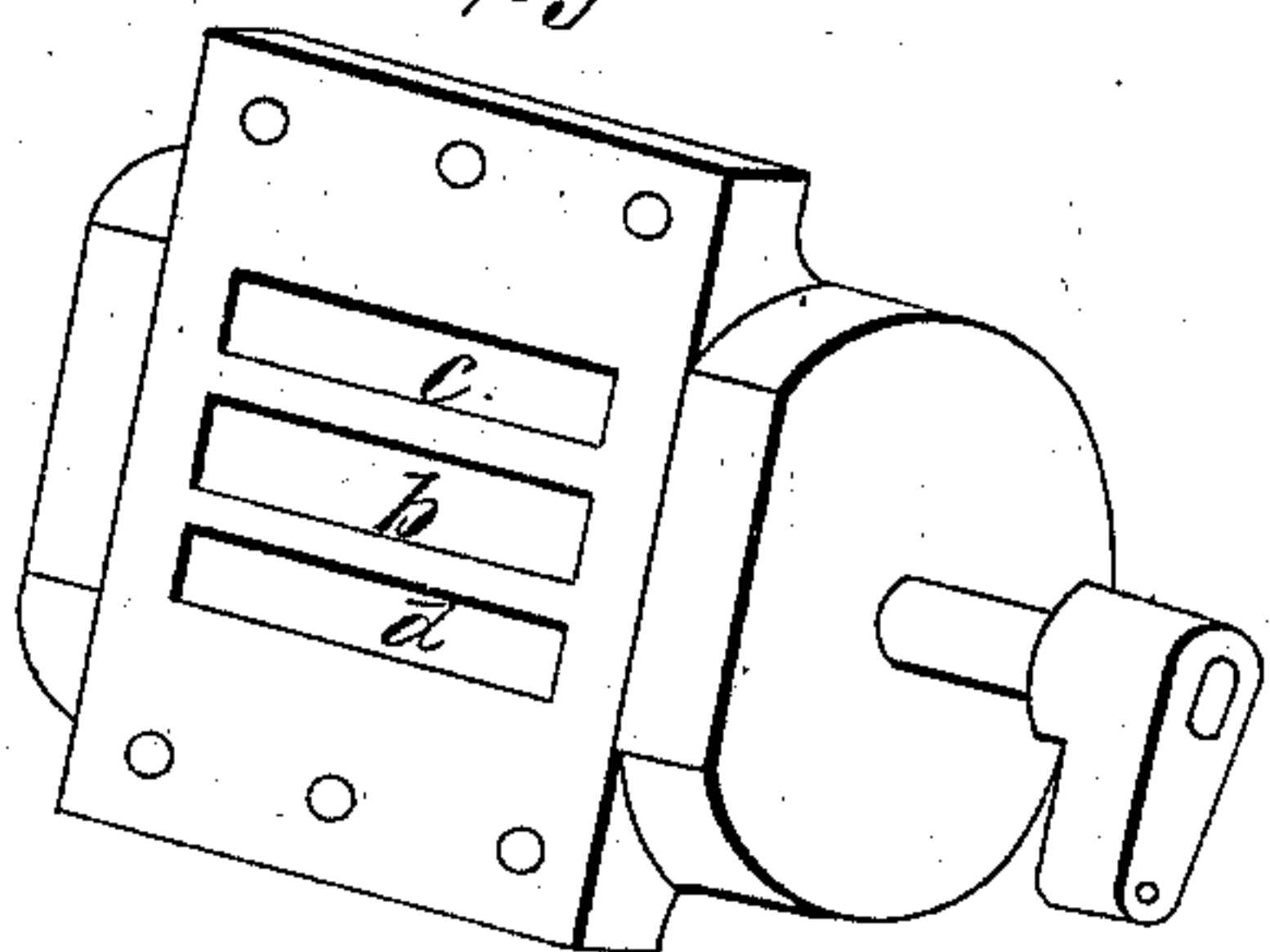


*T. Richards,*  
*Rotary Steam Valve.*  
*N<sup>o</sup> 54,959.      Patented May 22, 1866.*

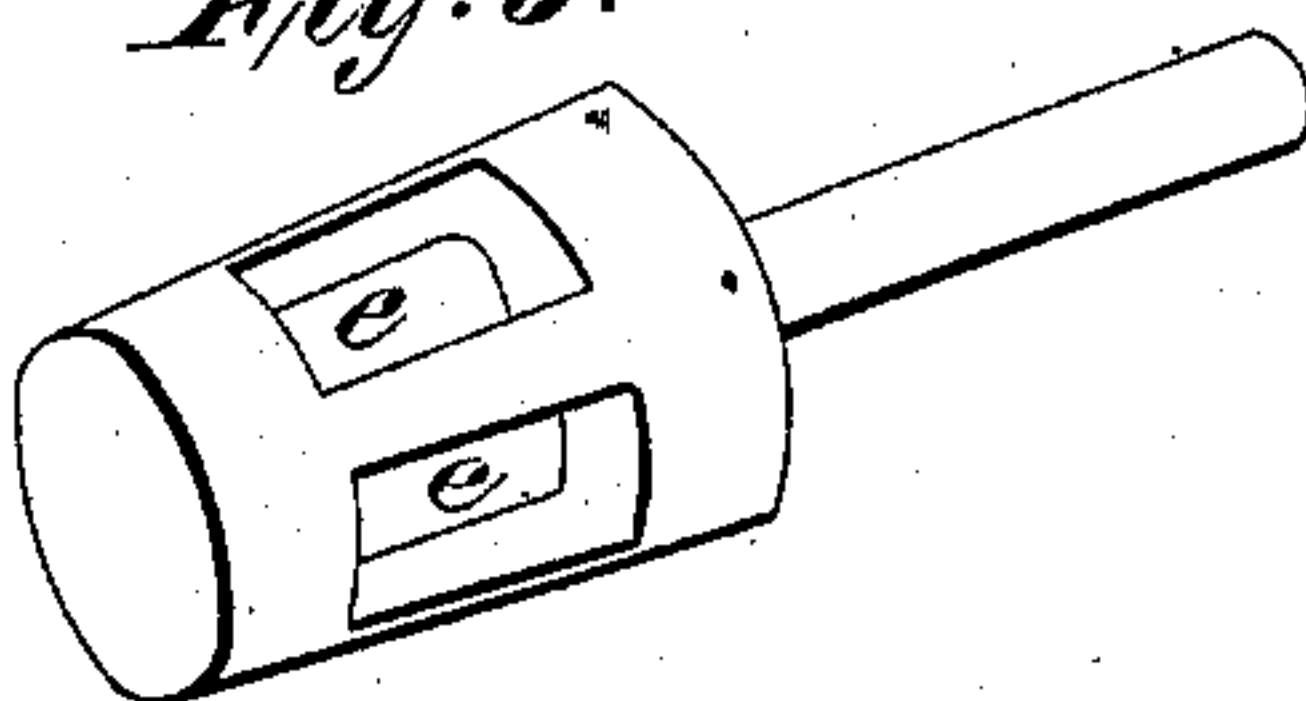
*Fig: 1.*



*Fig: 2.*



*Fig: 3.*



*Witnesses*  
*Samuel Brubaker*  
*Wm H Stillman*

*Inventor:*  
*Thomas Richards.*

# UNITED STATES PATENT OFFICE.

THOMAS RICHARDS, OF LANSINGBURG, NEW YORK.

## IMPROVEMENT IN BALANCE-VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 54,959, dated May 22, 1866; antedated May 7, 1866.

*To all whom it may concern:*

Be it known that I, THOMAS RICHARDS, of Lansingburg, in the county of Rensselaer and State of New York, have invented a new and useful Improvement on Steam-Engine Balance-Valves; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the arrangement of the steam and exhaust passages and those communicating with each end of the cylinder by a conical valve in such a manner that the valve is at all times balanced, and by the oscillating motion of the plug the alternate transmission of steam may be effected.

To enable others skilled in the art to make and use my invention, I proceed to describe its construction and operation.

Figure 1 represents a section of my valve, showing double ports, one on each opposite part of the valve, for the same purpose of transmitting steam to the cylinder and exhaust-passages. *a a* are the passages connecting with the boiler by a double steam pipe. *b b* are exhaust-passages for giving the steam into the smoke box; *c*, port for conducting steam and exhaust alternately to and from one end of the cylinder; *d*, for conducting steam to the other end and exhaust-port alternately by the oscillation of the plug. The valve being in its place, we will suppose the plug in the position shown, covering the two steam and two exhaust ports. Thus there will be no communication with either end of the cylinder. This is the position in which the valve would be when passing on to transfer the current of steam

from one end of the cylinder to the other. Now, if the plug be moved the steam will be admitted to one end of the cylinder, and that which is in the other allowed to escape. Move the valve back again, and the same effect will be produced in the opposite ends of the cylinder. The double port *c c*, communicating with one end of the cylinder, will be connected together by a passage passing half-way round the valve in the casting or by a passage across the head. *d d*, double port for conducting steam and exhaust to and from the other end of cylinder, connected together by a passage passing half-way round the valve in the casting or by a passage across the opposite head.

Fig. 2 represents a perspective view of my valve suitable for a locomotive, with the steam and exhaust pipes for conducting the steam to and from the cylinder in the back end of the smoke-box.

Fig. 3 represents the plug with four cavities, two of which, *e e*, are seen with the opposite cavities in the plug, receive and transmit the steam to the cylinder and exhaust-passages.

I do not claim for the number of ports in the valve-seat and cavities in the valve, that having been patented to myself February 23, 1858, (then residing in Plattsburg, New York.)

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

The within-described arrangement of the ports in valve-seat and valve, so as to make the steam and exhaust ports balanced under any pressure of steam, substantially as set forth.

THOMAS RICHARDS.

Witnesses:

EDWARD A. JUDSON,  
W. D. BAULAN.