

R. D. Turner,
Steam Balanced Valve.
No 53,707. Patented Apr. 3, 1866.

Fig. 2.

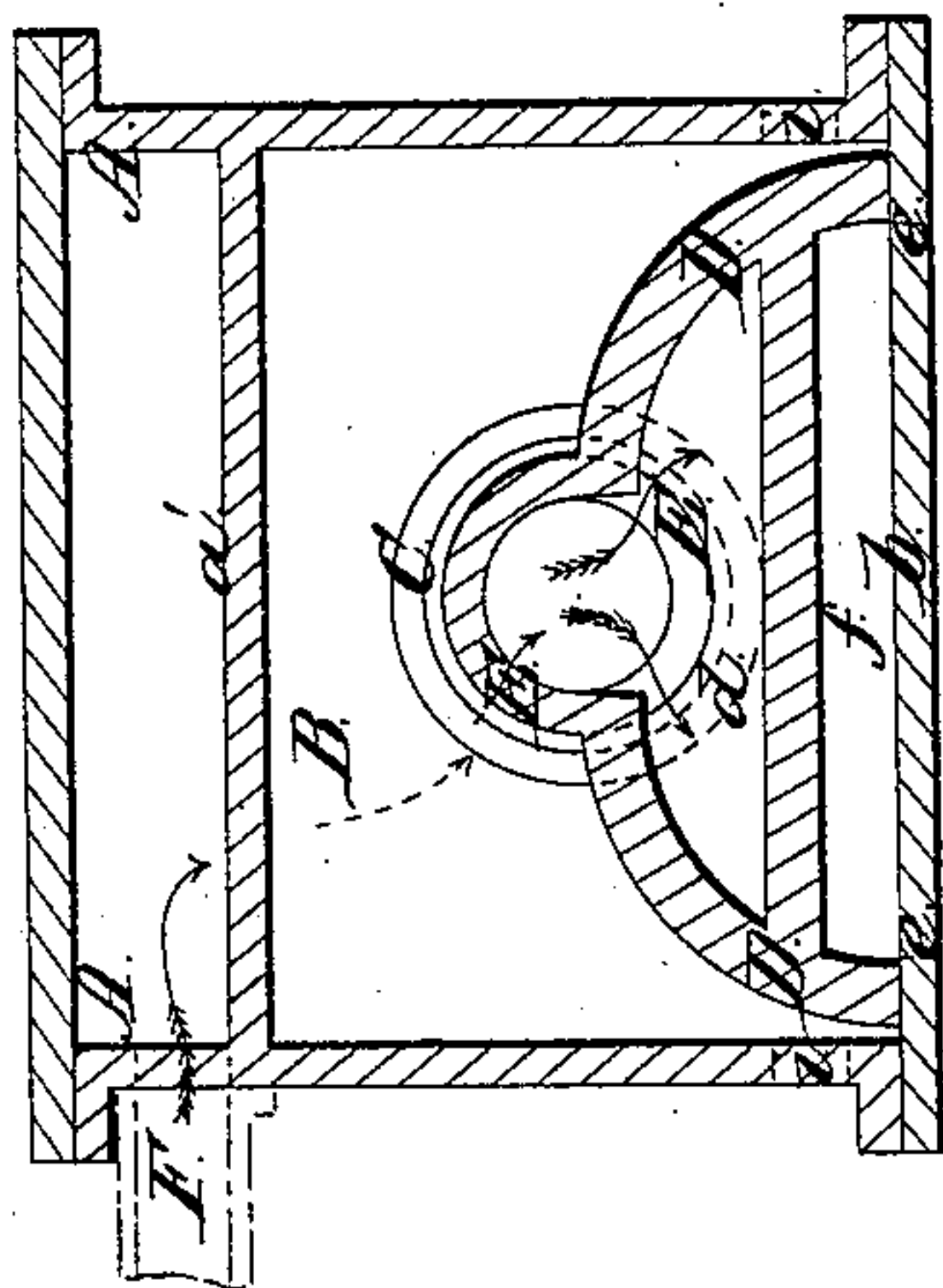
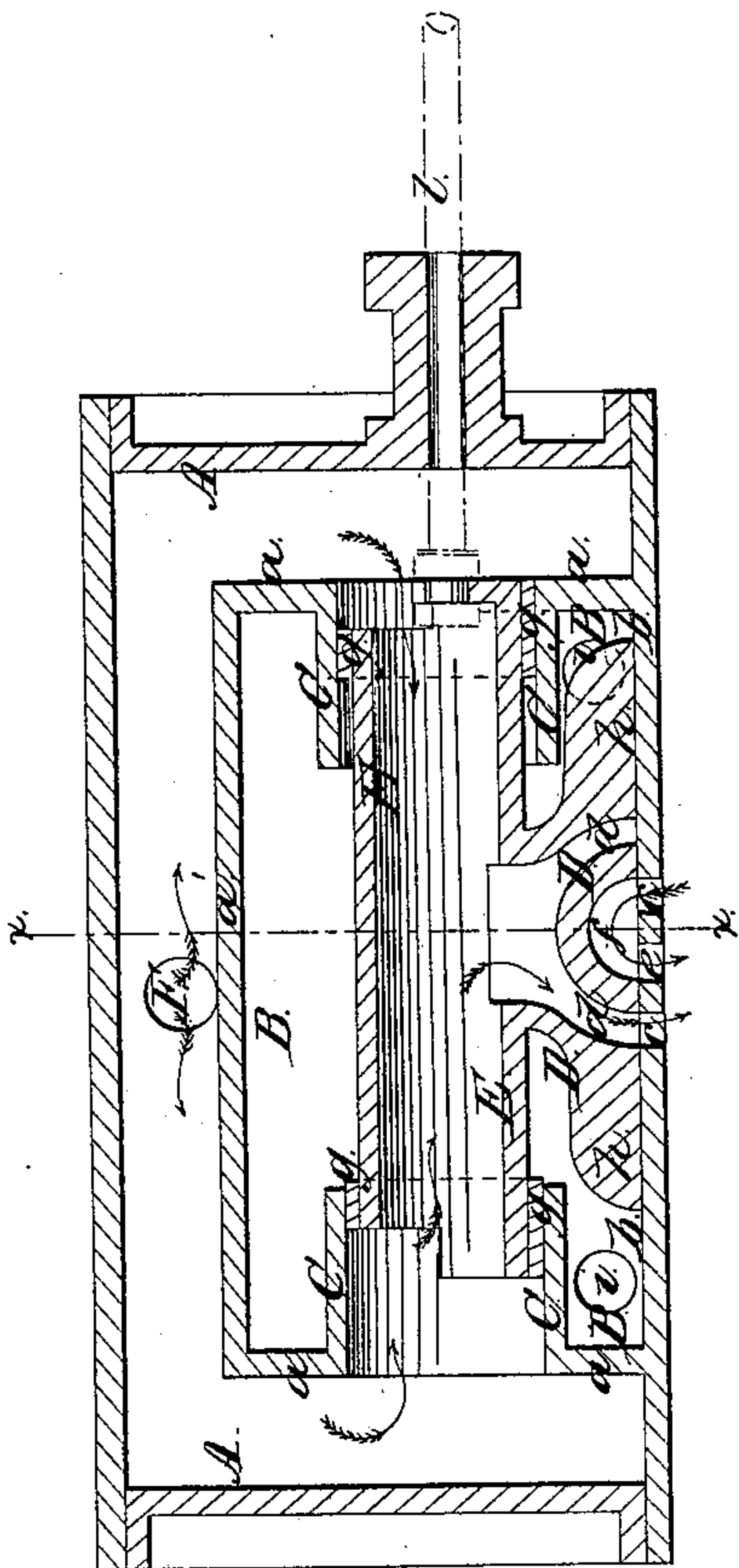


Fig. 1.



Witnesses.

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REUBEN D. TURNER, OF NEW YORK, N. Y.

IMPROVEMENT IN SLIDE-VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 53,707, dated April 3, 1866.

To all whom it may concern:

Be it known that I, REUBEN D. TURNER, of the city, county, and State of New York, have invented a new and Improved Mode of Relieving the Slide-Valves of Steam-Engines of Unnecessary Pressure; 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, forming part of this specification, in which—

Figure 1 is a central longitudinal section of the valve-chest and slide-valve of a steam-engine illustrating my invention. Fig. 2 is a transverse section of the same in the plane indicated by the line *x x* in Fig. 1.

Similar letters of reference indicate corresponding parts in both figures.

This invention consists in relieving the slide-valve of a steam-engine of unnecessary pressure by means of a properly-constructed hollow double-headed piston attached to the back of the valve, working in two cylinders provided within an inner valve-chest, and the interior of which forms a passage of communication between the steam-chest or outer valve-chest and the induction-ports of the valve, while its exterior is unexposed to steam-pressure.

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

A is the steam-chest or outer valve-chest, which resembles the valve-chest commonly used upon the cylinder of a locomotive-engine, to both ends of whose cylinder the steam is inducted and educted by one slide-valve, except that it may require to be somewhat longer and deeper to provide room within it for the inner valve-chest, B, which is formed by constructing across it, near the ends, two partitions, *a a*, perpendicular to the valve-seat *b*, and uniting the said partitions by a transverse partition, *a'*, parallel with the valve-seat, the said partition *a'*, like those *a a*, extending entirely across the outer chest, A. In the two partitions, *a a*, there are constructed two cylinders, C C, one in each partition, the said cylinders being in line with each other and parallel with the valve-seat *b*.

The valve-seat *b* has in it the usual arrangement of two steam-ports, *c c*, leading to opposite ends of the cylinder, and exhaust-port *e*, leading to the exhaust-pipe or condenser.

D is the slide-valve arranged within the inner valve-chest, B. This valve is of a well-known kind, having two steam-ports, *d d*, and an exhaust-cavity, *f*, between them, the said ports and cavity being so arranged that when either of the said ports is in communication with its respective port *c* in the seat *b* the other port *c* is in communication through the cavity *f* with the exhaust-port *e*, as shown in Fig. 1.

The ports *d d* are in constant communication with the interior of the hollow double-headed piston E, which is cast with or otherwise rigidly secured to the valve. This piston is hollow throughout, and its heads *g g* are packed or otherwise fitted to work steam-tight in the two cylinders, C C, one in each, while the face of the valve works steam-tight on the valve-seat. The ends of the said piston are open and in free communication with the interior of the outer or steam chest, A, with which the induction-pipe F of the engine is connected, so that when the engine is in operation the interior of the piston and the two valve-ports *d d* are always filled with steam; but steam is excluded from the inner valve-chest, B, and consequently from the back of the valve, by means of the packed piston-heads *g g* and the end portions, *h h*, of the valve, which extend beyond the ports *d d*, and the said valve-chest B has its interior in free communication with the atmosphere through openings *i i* in its sides, so that the exterior of the back of the valve cannot be subject to pressure greater than that of the atmosphere. These openings *i i* permit the escape of any possible accidental leakage of steam around the piston-heads into the inner chest, B.

The valve-stem *l* is attached to the piston E, and passes through the usual stuffing-box at one end of the valve-chest, and by giving motion to the piston gives motion also to the valves.

It has been explained how the back of the valve has the steam excluded from it, and it will be understood, as the whole exterior or periphery of the piston E is exposed to atmospheric pressure and the whole interior periphery of the said piston is exposed alike to steam-pressure, the steam would have no tendency to press the valve-down to its seat if the ends of the said piston were finished in plane surfaces perpendicular to the axis; but,

on the contrary, the steam, acting on a portion of the upper surface or back of the interior of the piston equal to the area of the ports $d d$, would tend to lift the valve from its seat. To counteract this latter tendency a portion of the upper part of the said piston at each end is cut away or made shorter than the lower or opposite part, and in this way the valve is as nearly as desirable balanced or allowed to have a just sufficient pressure toward its seat to insure its working steam-tight.

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

The hollow piston E, cylinders C C, and inner valve-chest, B, in combination with each other and with the valve D and outer chest, A, substantially as and for the purpose herein specified.

R. D. TURNER.

Witnesses:

HENRY T. BROWN,
J. W. COOMBS.