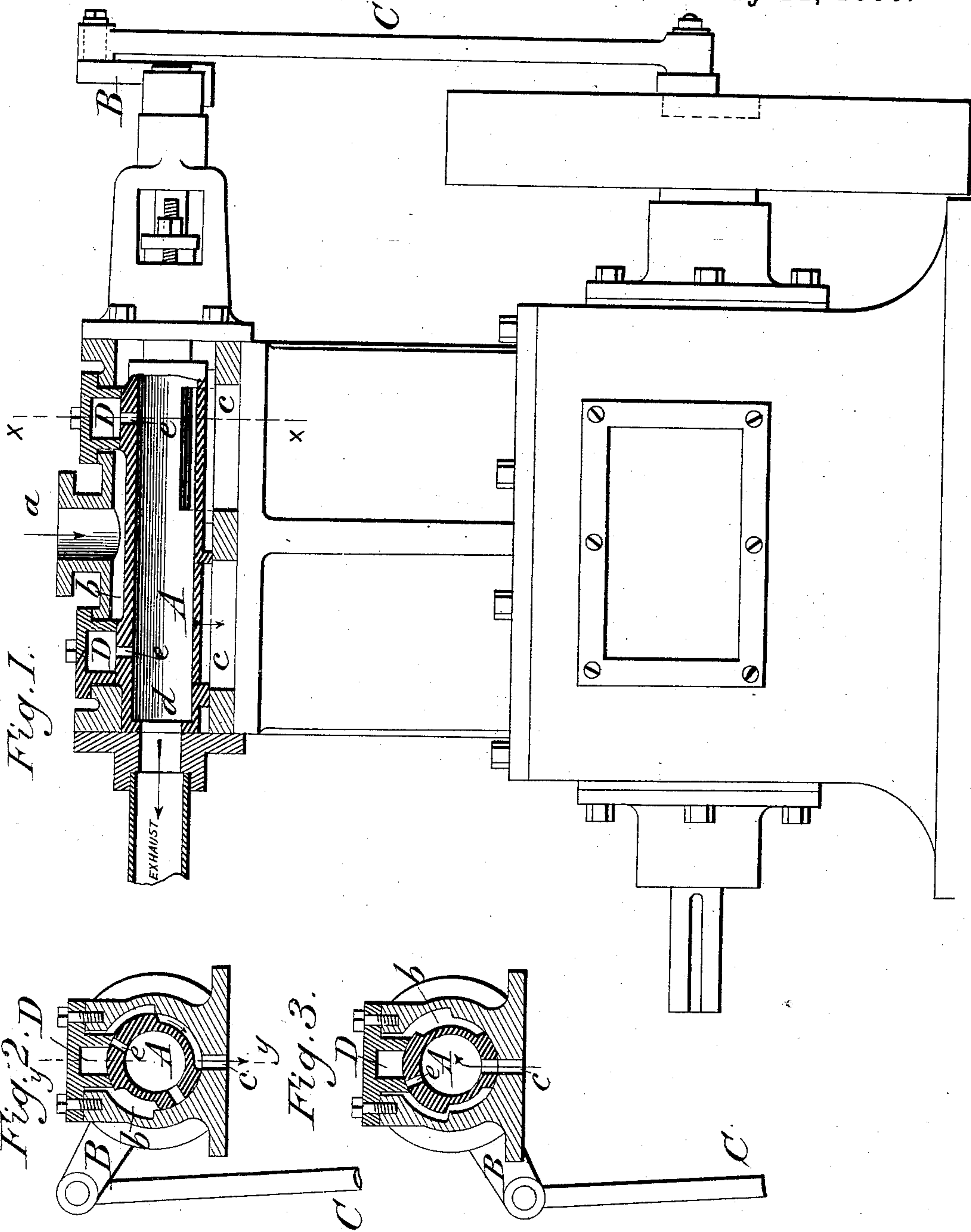


(No Model.)

J. RICHARDS.
STEAM ENGINE VALVE.

No. 341,691.

Patented May 11, 1886.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN RICHARDS, OF SAN FRANCISCO, CALIFORNIA.

STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 341,691, dated May 11, 1886.

Application filed March 5, 1886. Serial No. 194,157. (No model.)

To all whom it may concern:

Be it known that I, JOHN RICHARDS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Steam-Engine Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to an improvement in steam-engine valves, and particularly to valves used in connection with single-acting steam-engines similar to those described and claimed in the Letters Patent granted previously to me, No. 328,521, dated October 20, 1885; No. 328,522, dated October 20, 1885, and No. 336,747, dated February 23, 1886.

The invention consists in providing the valves with counter-ports or balancing-chambers, located at the back of the valve to relieve them wholly or in part from the steam-pressure, and thus permit them to operate with but little friction on or near their faces.

The invention further consists in constructing the balancing or compensating device of a chamber or chambers fitting upon the back of the valves, their area bearing a definite relation to that of the ports opposite, said chambers communicating with an exhaust-chamber in the interior of the valve, so that any steam passing into the chamber will pass out in the exhaust without other resistance than the back-pressure in the exhaust-pipe.

The invention consists, additionally, in making these counter pressure or balancing chambers detachable and adjustable, so that they can in construction be fitted steam-tight and afterward adjusted to compensate for any wear that may take place.

In the annexed drawings, illustrating my invention, Figure 1 is an elevational view of a single-acting steam-engine, showing in longitudinal section on *y y* of Fig. 2 my improved valve applied thereto. Fig. 2 is a cross-section on the line *x x* of Fig. 1, and Fig. 3 is a similar cross section, with the valve moved to the other extreme of the stroke.

Like letters indicate like parts.

A represents the valve, constructed after the oscillating pattern, and having an interior exhaust-chamber, *d*, and substantially similar in function to that shown in Letters Patent No. 328,521, of October 20, 1885. The oscillating motion is imparted to the valve by means of a crank, B, and a link, C, connecting the crank with other parts of the engine.

Steam enters at *a*, Fig. 1, and fills the annular cavity *b*, passing thence into the cylinders through ports *c c* when the valve is in the position shown in Fig. 2. The steam exhausts from the cylinders when the valve is in the position shown in Fig. 3, passing out at the end of the exhaust *d*, as indicated by the arrow.

The valve A is provided with counterbalancing or counter-pressure chambers D D. These chambers are preferably flanged and bolted to the main casing, as shown in Figs. 2 and 3, and rest on the top of the valve, so as to form a steam-tight joint. Said chambers are also formed with a sufficient area to counteract the unbalanced steam-pressure in the ports opposite the chambers or beneath the valve, and thus leave the valve in suspension or so situated that the downward pressure thereof will be greater than what is due to its weight alone, avoiding thereby friction and wear in use.

Holes or apertures are drilled at *e* to establish a communication between the chambers D D and the exhaust-chamber in the interior of the valve, which is furnished with the exhaust-opening *d*, so that any steam escaping into the chamber will pass out into the exhaust.

When the chambers D D and their flanges are removed, it permits easy access to the valve and an inspection of its working, so that an adjustment can easily be made. In case the valve should wear near its seat or in any other way such as would cause leakage, these chambers D D can be adjusted to compensate for the wear, and thus a steam-tight connection be maintained.

As shown in Fig. 1, the valve is represented in its adaptation to an engine with two cylinders; but it is obvious that its purposes and functions will remain the same when it is applied to one cylinder or when constructed with a single balancing-chamber.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with an oscillating
5 steam-engine valve having an interior exhaust-chamber, of a detachable and adjustable counter-pressure chamber or chambers located on the valve-casing and connecting with the interior exhaust-chamber, the parts being so
10 arranged that the steam within said chambers may balance the valve against the steam in the ports, substantially as shown and described.

2. The combination of the valve A, having
15 interior exhaust-chamber, *d*, the casing having annular cavity *b* and ports *c c*, and the balancing-chambers D D, communicating with the exhaust by passages *e*, the sizes of the bal-

ancing-chambers and the steam-ports being so proportioned that the steam-pressure may 20 hold the valve in suspension, substantially as shown and described.

3. The combination of a steam-valve, A, having an interior exhaust-chamber, the balancing-chambers D D, and the steam-ports *c c*, 25 said valve being held in suspension between the steam-pressure in the chambers and that in the ports, substantially as specified and shown.

In testimony whereof I affix my signature in 30 presence of two witnesses.

JOHN RICHARDS.

Witnesses:

FRED E. TASKER,
C. J. STOCKMAN.