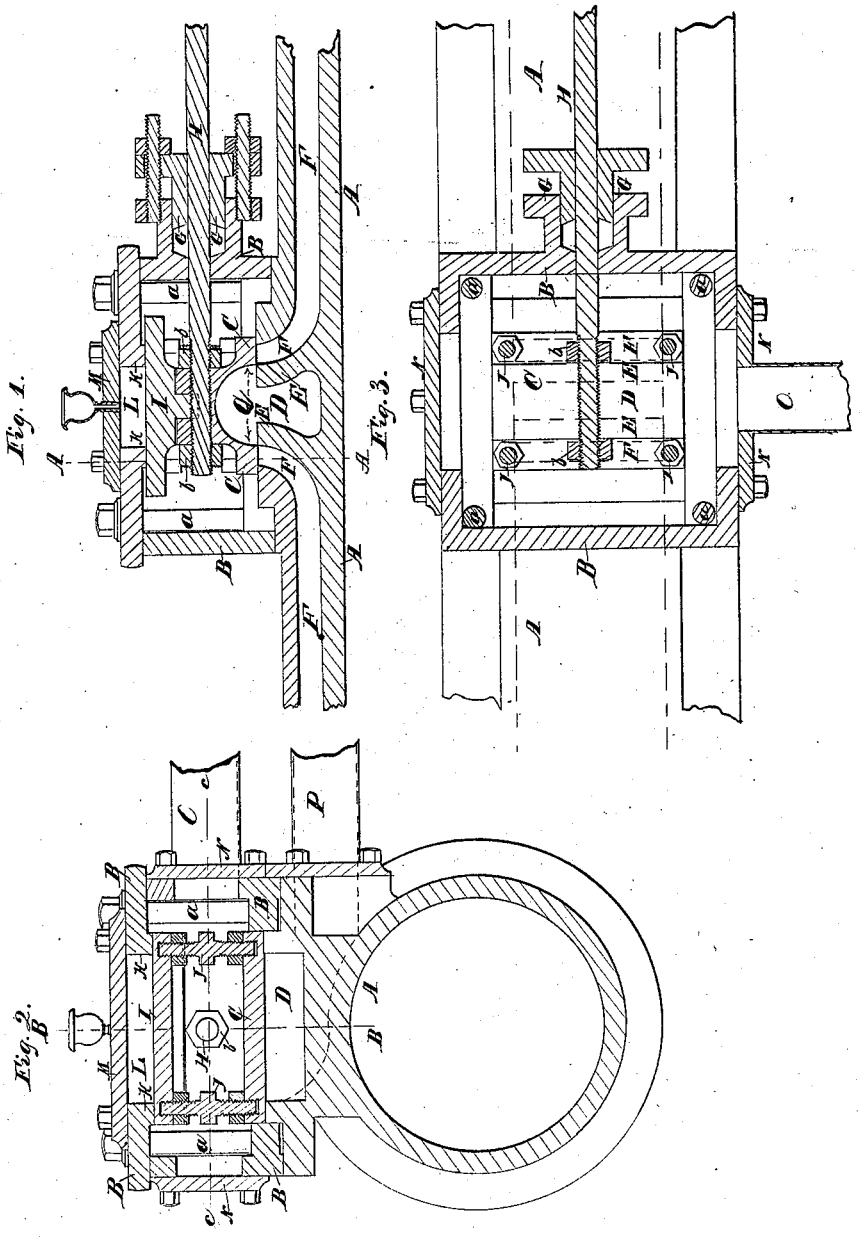
S. F. Gates,

Steam Balanced Valve.

No. 4,907. Patented Dec. 28, 1846.



UNITED STATES PATENT OFFICE.

STEPHEN F. GATES, OF BOSTON, MASSACHUSETTS.

SLIDE-VALVE OF STEAM-ENGINES.

Specification of Letters Patent No. 4,907, dated December 28, 1846.

To all whom it may concern:

Be it known that I, STEPHEN F. GATES, of Boston, county of Suffolk, and Commonwealth of Massachusetts, have invented a new and useful improvement in slide-valves for steam-engines and other purposes by diminishing the friction and relieving the pressure of the steam or fluid, as the case may be, on the valve as now used, and thereby forming a balance slide-valve; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being herein had to the annexed drawings, which constitute a part of this specification.

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

Description of the annexed drawings.—Figure 1 represents a vertical section of the steam chest, valve and a portion of the cylinder, as cut through at the line B, B. Fig. 2, represents a transverse vertical section of the same, as cut through at the line A, A. Fig. 3 represents a horizontal section of the same, as cut through at the line C, C.

Description of a steam chest, valve, cylinder and appending apparatus, including my improvement, by reference to the Figs. 1, 2, and 3, in the drawings.—The letters used in this specification refer to the corresponding letters in all the Figs. 1, 2 and 3.

A, is a part of a steam cylinder to which a steam chest B, is attached by means of the bolts *a*, *a*, *a*, *a*.

C is a common slide valve as now generally used and rests on the valve seat attached to the cylinder and covers the exhaust port D, the bars E, E, and the steam ports F, F.

G is a stuffing box attached to the steam chest.

H is a valve stem, and passes through the stuffing box and is attached to the valve C by the nuts *b*, *b*, at each end of the valve C.

A blank valve I is attached to the back of the slide valve C by the screws J, J, or by other like means, and fastened so as to prevent the two valves (C and I) from separating, and thus fitted or fastened together they are compelled to move together.

The valve I is set so as to touch the inverted seat K and is made steam tight by grinding the surfaces.

L is a false aperture through the top of the steam chest which aperture is closed with a cover M to prevent dirt or other matter from lodging on the blank valve I.

The cover M has an oil cup or aperture on the outside (as shown in Figs. 1 and 2) thus leaving an opening from the atmosphere to the surface of the blank valve I, by means of which the pressure of the atmosphere on the upper side of the blank valve I is made equal to the pressure of the atmosphere on the under side of the valve C, thus equalizing the atmospheric pressure, and operating friction from its inequality. This cap is also used to pour oil upon the upper side of the blank valve I, for the purpose of reducing friction and keeping it moist.

N N are covers on the sides of the steam chest and are attached to it by screws and can be removed to adjust or examine the valve.

O is the steam pipe.

P is the exhaust pipe, having a connection with the atmosphere or condenser as the case may be.

Q is the span of the valve C.

The operation of the valve (meaning the valves C and I fastened together, and thus constituting the valve as above described) is as follows: The steam is admitted through the pipe O to the whole interior of the steam chest B, and presses on all parts equally. But the pressure on the back of the valve now generally used (C) without the blank valve I, causes it to adhere to the seat with such force as to produce great friction. The valve herein described is made to move backward and forward in the common manner by means of the stem H, opening the steam ports F, F, for the admission of the steam into the cylinder and permitting the exhausted steam to escape through the port D in the common manner. By means of the blank valve I being attached to the back of the valve C, and the false aperture L having the required proportions or area, to the area of the span Q (of the valve C) connected by the exhaust pipe with the atmosphere or condenser and the inverted seat K, bearing its due proportions to the wearing surface of the valve C resting on the seat attached to the cylinder—and the valves (C and I) being so adjusted by the connections J J as to be made to touch the seats and thus render them (the valves) steam tight—the pressure of the

steam on one of the valves is neutralized by the pressure of the steam on the other, thus preventing friction and allowing the whole valve (*i. e.* C and I combined as above described) to move as freely when under a great pressure as when there is no pressure at all. The surface of the blank valve I should always be made sufficiently long to allow the valve to perform its operations and not leave the edge of the seat.

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

The described means of neutralizing the effect of the pressure of the steam (or fluid as the case may be) upon the back of the valves (C, and I) and equalizing the pressure of the atmosphere on the upper side of the blank valve I and on the under side of the valve C, thus preventing friction and allowing the valves to move with perfect ease when under a pressure, as above set forth, viz. by applying or attaching the blank valve I to the commonly used slide valve C, as above described, in combination with the false aperture L and the aperture to the atmosphere through the cover M, and the inverted seat K, as above described; and all operating as mentioned and set forth.

Dated at Boston September eighth, A. D. 1846.

STEPHEN F. GATES.

Witnesses:

HENRY B. STANTON,
HENRY P. HOLLAND.