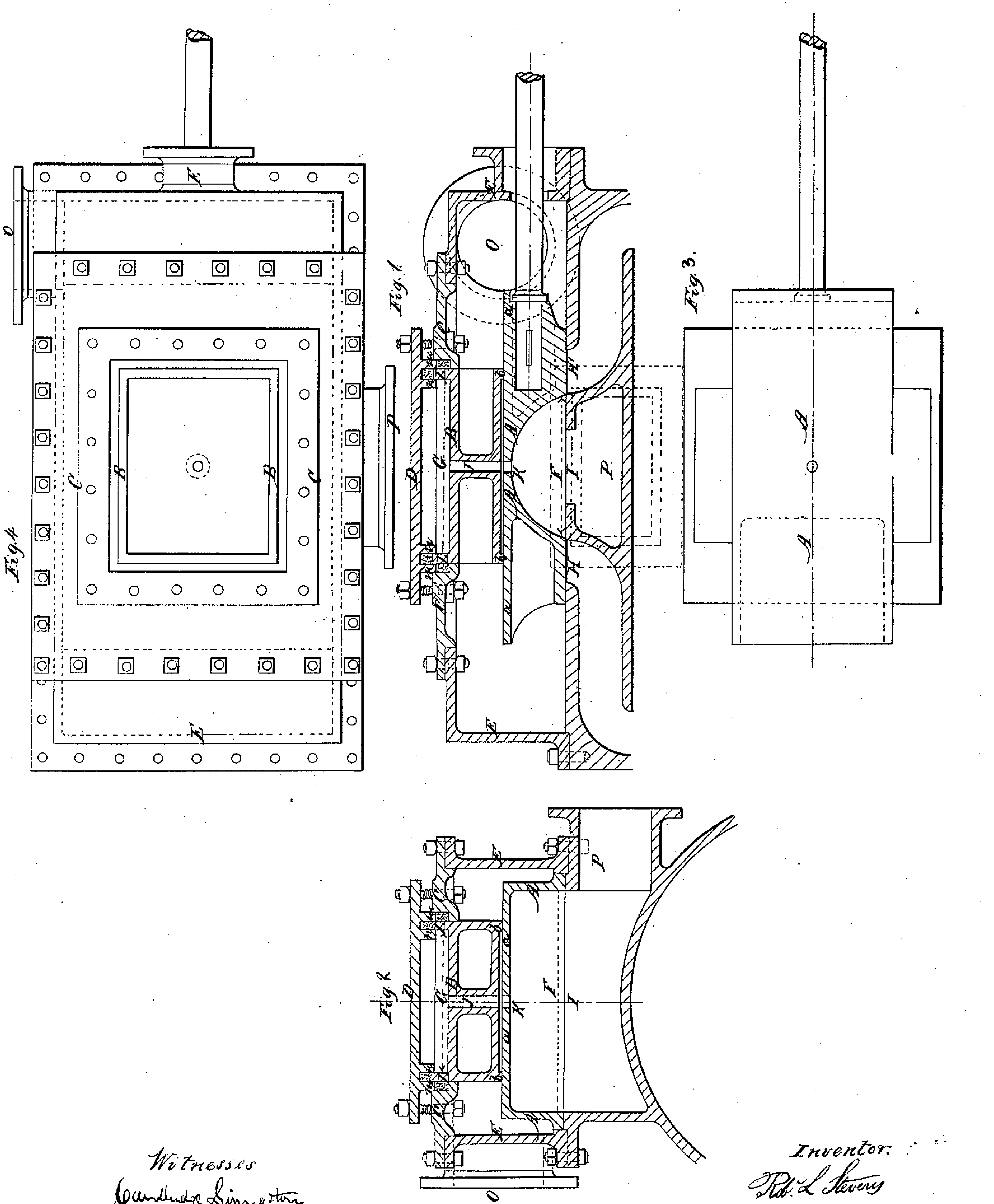
R. L. Stevens,

Steam Balanced Valve.

No. 14,419. Patented Mar. 11, 1856.



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UNITED STATES PATENT OFFICE.

ROBERT L. STEVENS, OF HOBOKEN, NEW JERSEY.

MEANS FOR REDUCING THE FRICTION OF SLIDE-VALVES OF STEAM-ENGINES.

Specification of Letters Patent No. 14,419, dated March 11, 1856.

To all whom it may concern:

Be it known that I, ROBERT L. STEVENS, of Hoboken, New Jersey, have invented a new and Improved Mode of Reducing the Friction of the Slide-Valves of Steam-Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The drawings represent my improvement, together with other parts of ordinary single slide-valves.

Figure 1, is a longitudinal section. Fig. 2, is a transverse section. Fig. 3 is a top view of the slide-valve. Fig. 4, is a top view of the valve chest E, and bonnet C, with the follower or cover removed.

Similar letters represent similar parts of the respective drawings.

Letter A is the slide-valve; letter B, the balance block or box; letter E, the valve chest; letter C, the bonnet to the valve chest with the stuffing box; letter D, the follower to the stuffing box; letter F, the exhaust-port of the slide-valve; letter G, the space or cavity above the balance block; letter H, H′, steam ports of the cylinder; letter I, the exhaust-port of the cylinder; letter J, a small hole which, with K, forms a communication between the spaces F and G.

I use the ordinary slide-valve modified as follows: I cast or construct upon the top of the slide valve, a plane face A A, *a*, *a;* that must be so long and so wide that in the passing of the valve back and forth in its ordinary motion, the ground faces *b*, *b*, of the balance block B, (which is stationary) shall rest upon the said plane face, which latter should be ground also. The valve A, A, has a hole K, through the center of the plane face. The balance block B, is a box with its ends open, through which the steam passes on its way to the port. The surface of the box B, is less than that of the plane face of the slide valve, being so much less as to leave a margin of the said plane face around the box, when the valve is in motion, so as to allow enough pressure of the steam on the said plane face as to press the valve down, and keep its lower face tight. The block B, has ledges L L, projecting upward around its upper face. The lower face of block B, also has ledges *b*, *b*, around it, projecting downward;—the faces of which ledges should be ground, and made to fit, steam-tight to the top of the plane face A, A, *a*, *a*, of the slide-valve. The projections, *b*, *b*, should be sufficient to allow a space between the plane face A, A, and the lower face of B, say of about half an inch. The ledges L, L, should project, (say 2 inches) from and around the upper face of B, sufficiently high to make a tight joint against the steam passing from the steam chest into the space G, caused by the ledges, and also to prevent the air passing into said space G. The block B, is cast or made with a pipe or hole J, through it, so as to form a communication between the space G, and the hole K, in the slide valve A, A.

D, is a follower or cover which has double sets of ledges, *m*, *n*, *m*, *n*, projecting from its lower face, one on each side of, and all around the ledges L, L. The outer ledges *m*, *m*, of D, should be made to pass between the outer side of the ledges L, L, and the side of a recess in the bonnet C. India rubber, or other packing suitable for making a tight joint should be placed in the recess or cavity formed by *m*, *n*, *m*, *n*, so as to fit tight on the top face of the ledges L L. India rubber or other suitable packing should be placed in the recess between L, L, and the side of the recess in the bonnet C. It would be better that the faces of the ledges L, L, and *m*, *m*, *n*, *n*, should be planed so as to make perfect joints. The cover D, should be fastened by screw-bolts to the bonnet C, thus making perfect joints on the two packings. The bonnet C, is secured by bolts in the usual way to the steam chest E. The steam is admitted into the steam-chest at O.

P, represents the opening from the cavity under the slide to the condenser.

The operation of the balance block valve is as follows:—The steam being let in at O, passes to the port H, through and on both sides of the block B. When the steam enters through the port H, it, of course, passes directly from the opening O, to the port H, without passing through or around the block B.

As the space or cavity G, is connected with the condenser by means of the hole or pipe J, in the balance block B, and the space between the lower face of B, and the plane face of A, A, *a*, *a*, (which space or cavity is created by the ledges *b*, *b*,) together with the hole K, in A A,—it will be apparent that when there is a vacuum in the condenser there will be a like vacuum in the space G,

and in the cavity between the lower face of B, and the upper face of A A. Thereby the pressure of the steam will be taken off of the slide-valve A A, for a space equal to the said cavity under the balance block B; thus proportionately reducing the friction of the slide valve in its operation. Consequently much less power will be required to work it, and the valve will remain tight for a much longer time. The main slide valve can be made either of brass or iron.

I am aware that devices have been contrived with a view to effect the reduction of the friction of the slide valves of steam engines, by attempting to counteract or balance the pressure of the steam on the valve; but I am not aware that any plan or combination similar to that which I have above described has been used or described before.

I claim as my invention—

The box or balance block B constructed substantially as above described, in combination substantially as above described with an ordinary slide valve altered as above described; said balance block having around the edges of its upper face, ledges L, L, which project upward and are made to fit around the whole upper face with a recess, such as is above described, in the follower D and formed by double ledges projecting down from D and inclosing L which recess has an india rubber packing in its bottom against which the said ledges L are made to pack steam tight together with another similar recess formed by the ledges L L and a part of the bonnet C, into which latter recess one of the ledges of the follower D fits tight in the same manner as the ledges L, fit in the recess.

Hoboken 8 Feby 1856.

ROBT. L. STEVENS.

In presence of—

CAMBRIDGE LIVINGSTON,

LUKE STAMBIE.