C. H. HUTCHINSON.

Balanced Slide-Valves.

No. 144,458. Patented Nov. 11, 1873.

Fig. 1

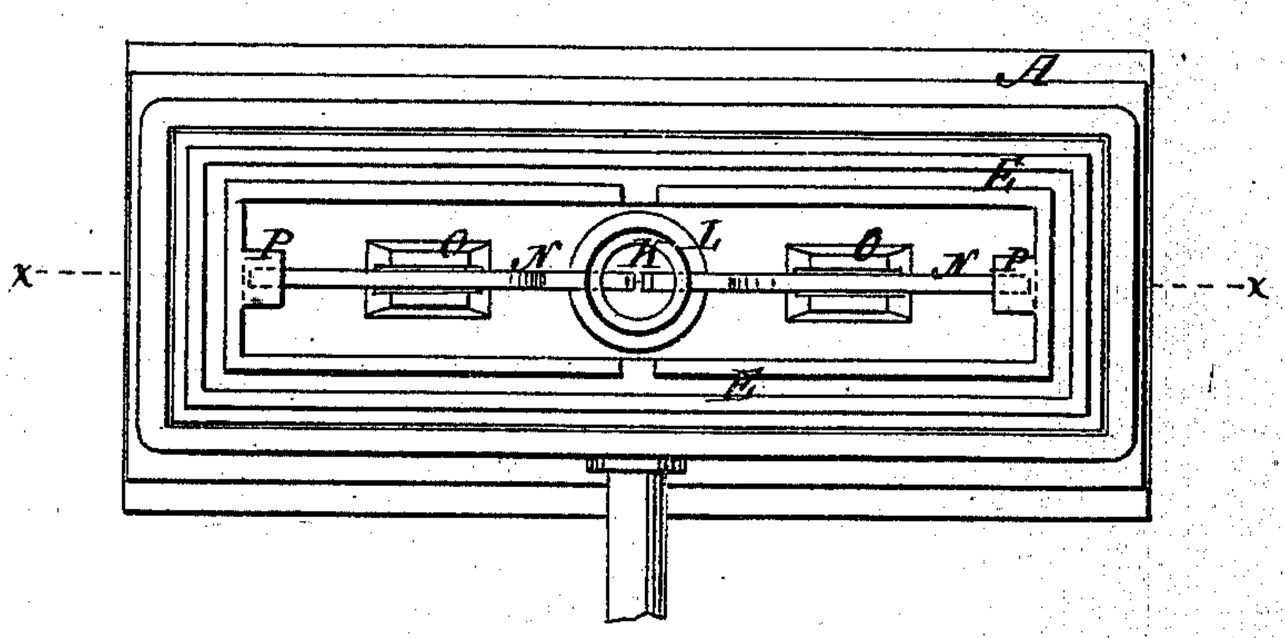
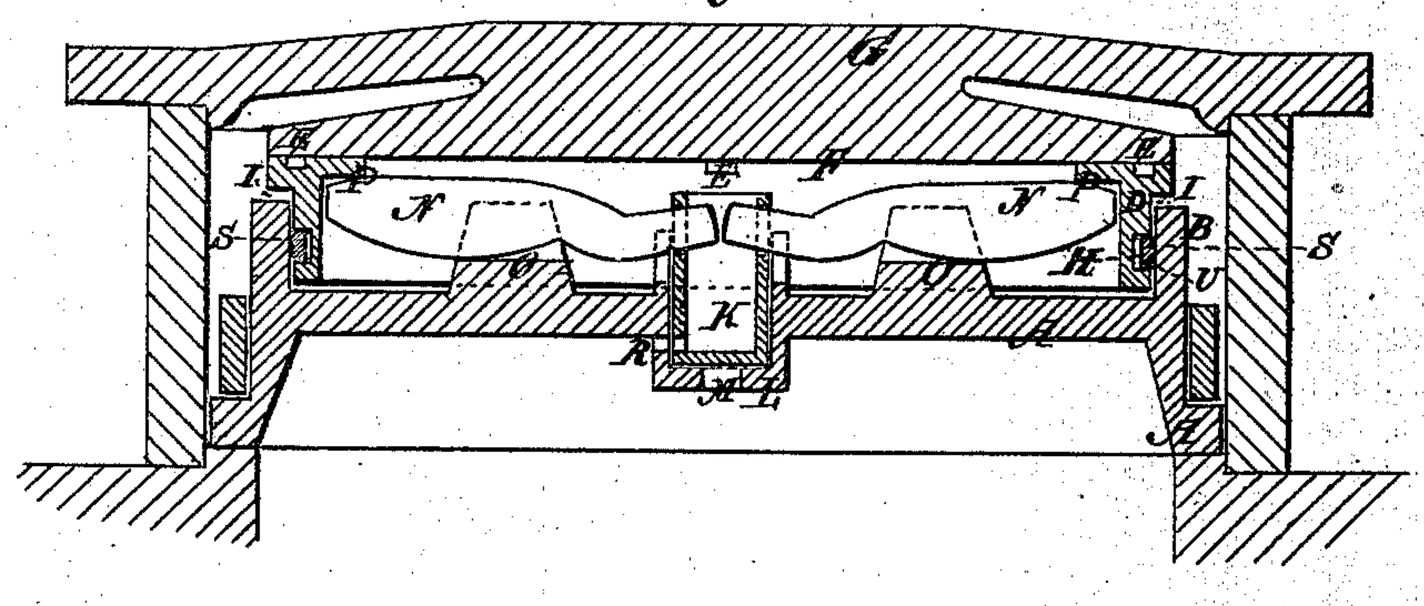


Fig. 2



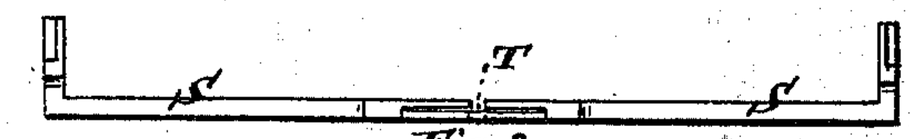


Fig. 3.

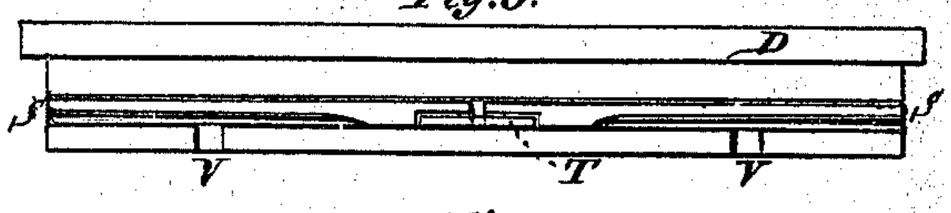


Fig. 4.

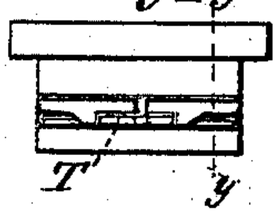
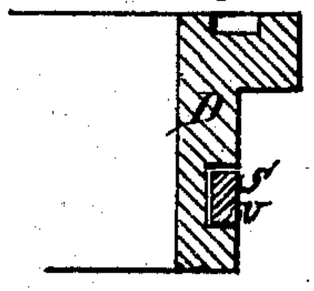


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES H. HUTCHINSON, OF CONCORD, NEW HAMPSHIRE.

IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. **144,458**, dated November 11, 1873; application filed September 13, 1873.

To all whom it may concern:

Be it known that I, CHARLES H. HUTCHINSON, of Concord, in the county of Merrimack and State of New Hampshire, have invented a new and Improved Balanced Slide-Valve, of which the following is a specification:

The invention will first be fully described, and then pointed out in the claims.

Figure 1 is a plan view of my improved valve. Fig. 2 is a sectional elevation taken on the line *x x*. Fig. 3 is a side elevation of the upper or balancing part of the valve. Fig. 4 is an end elevation of Fig. 3. Fig. 5 is a section of Fig. 4 on the line *y y*, and Fig. 6 is a plan view of a couple of the packing-pieces.

Similar letters of reference indicate corresponding parts.

A represents the valve, on the top of which is a short cylinder, B. D is the top or balancing part, which has a face, E, on its upper end, adapted to work steam-tight against the inner face F of the steam-chest top, and is fitted below the top to work up and down within the cylinder B, as is necessary, so that the face E will work steam-tight at all times. The joint between D and B is packed at H with steam-packing. The part D, working against the steam-chest face F, excludes the steam from the top of the valve A, and, therefore, relieves it of so much down pressure as is due to the area on said valve from which it excludes the steam. It is held up to said face F by the steam-pressure on the shoulders or flanges I. When the steam is shut off, and the said shoulders or flanges relieved of the pressure, the part D will, of course, fall away from the face F, and open a free passage for the steam when let on again to fill the space above part D, and thus defeat the object of the balancing part by pressing it down on the valve just the same as if said part D were not used; hence it is necessary that some means be employed either to hold part D up when steam is shut off, or to lift it when steam is let on. It is for keeping it up that the springs before referred to, which I now propose to dispense with, have been used. The plan which I now propose is, to use the steam for lifting the balancing part D when the throttle-valve is opened; and to this end I have, in this example, arranged a little piston, K, in a cylinder, L, in the top of the valve A, which is open to the exhaust at M, and connect said cylinders with levers N, resting in studs O, and arranged at the ends of the short arms under the flange P, so that as soon as steam enters the chest, and acts on the piston K, it will, by forcing said piston down, lift D up against face E, and shut off the further passage of steam to the chamber within part D, which said chamber, being by the same operation opened to the exhaust by the hole Q in the piston coming to the hole R in cylinder L, will relieve the pressure in the chamber D, so that the steam will afterward hold said part D up by the flanges I. While I prefer this arrangement of the piston K and its cylinder and the levers, I do not confine myself to it, because other plans may be employed. For instance, a piston may be arranged through the side of D, with a wedge or incline inside of the chamber acting on the levers or directly on the flanges P, may be used.

By another plan, the levers and piston K being arranged in the same positions as here shown, but the levers being changed so as to rest on their fulcrums at the ends, and to act on the flange P, or a projection from it between the fulcrums and the piston, and the steam being admitted to cylinder L under the piston, and the holes in the cylinder L being stopped, the same result would be produced, if an exhaust to take the place of holes Q and R be provided, which can, of course, be readily contrived in various ways.

The arrangement is such that when the steam is shut off the part D of the valve falls, and the piston K rises and closes the escape-passages Q R. The object of this is twofold—first, to hold the steam, so that the piston will be actuated by it when let on again; and, second, to close the passage up through the valve from the valve-seat, so that when the engine continues to run after steam is shut off, as when going down grades, the vacuum caused by the piston in the cylinder will be operative upon the whole area of the upper surface of the valve, so that the latter is allowed, by the dropping of part D, to lift from its seat by said suction in the same manner that the ordinary slide-valve does, and allows the air to escape from the front of the piston under the valve to the other side of the piston, and thus pre-

vent the holding back of the piston, as it does when the arrangement of the balanced valve is so that the vent for the escape of the pressure from the chamber in part D does not close when steam is shut off.

S represents the angle pieces of packing, such as I propose to employ to avoid the open joints at the corners of square cylinders, which cannot be packed, and to make the joints at the sides of the cylinder where the splice-pieces T can be used. I propose to form these pieces of packing by casting them in the packing-groove in the part D, in which they work.

To dispense with the use of springs for forcing said packing out against the side of cylinder B, I narrow the outer face of this packing by forming a groove in the face or beveling off the lower corner, as at U, and connecting said groove or the space formed by beveling off the corner with the exhaust by one or more notches, V, leading into the chamber in part D, so that, the inside surface of the packing being greater in area, the packing will be forced out by the steam which finds its way into the space in the groove behind the packing.

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

1. The valve A, having a cylinder, B, and balance D, combined with piston K, connected with said part D by levers N and studs O, substantially as and for the purpose described.

2. A valve, A, having a cylinder, B, and balance D, with chamber L, having apertures R, combined with piston K, as and for the purpose set forth.

3. The combination of angle packing-pieces S with a square cylinder and piston, substantially as specified.

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