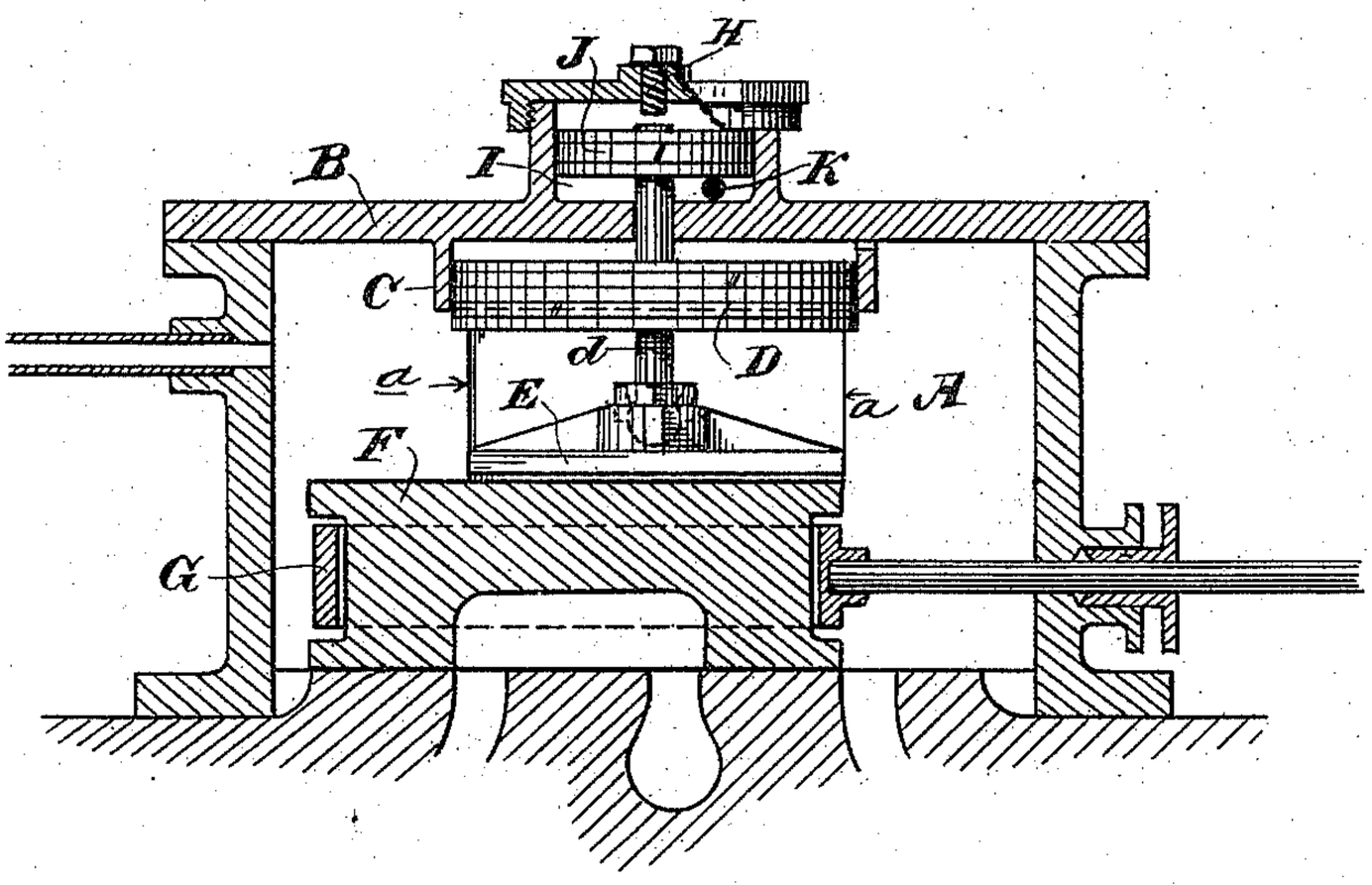
(No Model.)

G. R. HERRICKS.

BALANCED SLIDE VALVE.

No. 575,155. Patented Jan. 12, 1897.



Witnesses,
L. Stanse
H. F. Ashcroft

Inventor,
George R. Herricks
By Dewey & Co.
Atty's

UNITED STATES PATENT OFFICE.

GEORGE R. HERRICKS, OF SAN FRANCISCO, CALIFORNIA.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 575,155, dated January 12, 1897.

Application filed July 20, 1896. Serial No. 599,856. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. HERRICKS, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Balanced Slide-Valves; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an improved means for balancing slide-valves.

It consists in certain details of construction which will be more fully explained by reference to the accompanying drawing, in which the figure is a vertical sectional view taken longitudinally through the steam-chest, valve, and balancing mechanism.

The object of my invention is to provide for perfectly balancing the slide-valves of steam-engines, and it is applicable to locomotive or stationary engines, being especially desirable for use upon locomotive-engines where a high pressure of steam is employed and a rapid reciprocation of the valve.

A is the steam-chest, having the cover B, which is secured by bolts and packed around the periphery in the usual or any suitable manner. From the lower part of the steam-chest cover a short cylindrical chamber C projects downwardly into the steam-chest. Within this chamber is fitted a piston D, having packing-rings, so that it works steam-tight within its cylinder. A central stem *d* extends downwardly from this piston and has at the lower end a ball-joint connection, which carries a plate E. This plate extends transversely across the steam-chest and is movable vertically in channels or guides *a*, formed on the sides of the steam-chest, as shown. Beneath this plate the valve F is adapted to slide, its upper face moving in contact with the lower surface of the plate E and its lower face moving over the valve-seat, in which are the steam and exhaust ports arranged in the usual manner.

The valve is inclosed by the loose-fitting yoke G, and the valve-stem connects with this yoke, extending out through the end of the steam-chest and connecting with the rocker-arm or usual mechanism, by which it is reciprocated.

The upper and lower faces of the valve have the same width of flange projecting around them, and the yoke is movable between these two faces, so that any irregularity in the movement of the valve-stem and yoke will not be communicated to the valve, the latter sliding in a perfectly true line when acted upon by the yoke.

By reason of the equal width of the top and bottom flanges it will be seen that the pressure upon the valve is equalized, and, whatever pressure of steam may be in the steam-chest, it presses upward and downward equally.

The plate beneath which the upper surface of the valve moves prevents any downward steam-pressure directly upon the top of the valve. As this plate is connected with the piston D, movable in the cylinder C, and the piston having the same area as the plate, it will be seen that the pressure of the steam will be exerted equally on the piston and the plate and there will be no undue pressure of the plate upon the valve. In practice the area of the piston is just enough greater than that of the plate to counterbalance the weight of the piston and the plate and relieve the valve of their pressure. The ball-joint connection between the plate and the stem of the piston insures the plate being always parallel with the valve-face and prevents its being turned by reason of any irregularity in putting on the steam-chest cover. When steam has been shut off, and in such cases as where the engine is running downgrade without steam, it is preferable to relieve the valve of the weight of the plate E and piston D. In order to do this I have shown a small cylindrical chamber I, extending upwardly above the steam-chest cover B and having a piston J fitted within it. Beneath this piston a pipe or passage K opens, the pipe leading to some point within control of the engineer, so that when the throttle-valve is closed and steam is cut off from the steam-chest, the valve controlling the passage to this small cylinder is opened and steam admitted beneath the piston J. This piston J is connected with the piston D by the rod or stem *d*, which extends up through the steam-chest cover B, so that when a pressure of steam is applied to the lower surface of the piston J it will act as a counterbalance to support the weight of the

piston D and the plate E and thus relieve the main valve F of this weight.

When the engine is in motion, the exhaust of the steam from the cylinder produces a considerable upward pressure upon the valve, and in order to resist this I have shown a central set-screw H, passing through the steam-chest cover, so that its point may be brought to press upon the center of the piston, after which it is locked by a lock-nut and thus prevents any upward movement of the valve by preventing the piston B and the plate, beneath which the valve moves, from being forced upward. This screw may be fitted into the main cover B when the piston J is not used and into the cover of the cylinder I when this supplemental piston is used. The whole forms a well-balanced slide-valve, with conveniences for adjusting and regulating it as may be desired.

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

1. The combination, of a slide-valve the upper and lower faces of which are provided with flanges, a steam-chest within which it is adapted to reciprocate, a yoke loosely embracing the valve and movable between the flanges thereof, a cylinder fixed to the inner side of the steam-chest cover opposite the valve, a piston within the steam-chest and movable within the open end of the cylinder, at right angles with the movement of the valve, a vertically-guided plate having approximately the same area as the piston and resting upon the back of the valve, and a stem connecting the plate and the piston whereby the pressure of steam acts equally upon the piston and plate and the valve is relieved therefrom.

2. In an engine having a slide-valve and a containing steam-chest, a yoke loosely fitting the valve between flanges projecting from the upper and lower faces thereof, and connected with the valve-stem, a plate resting upon the back of the valve, its ends movable in vertical guides whereby its position is maintained, a piston of approximately the same area movable in a short cylinder projecting inwardly from the steam-chest cover and into the steam-chest, a rod or stem connecting the piston with the plate, having a ball-joint at the point of connection whereby irregularities in the position of movement of the plate and piston are corrected, and the plate allowed to adjust itself to the back of the valve.

3. In an engine having a slide-valve with flanges on its upper and lower faces and a steam-chest within which it is reciprocated, a yoke loosely embracing the valve between said flanges, and connected with the valve-stem, a plate fitting against the back of the valve and guides by which it is retained in position with relation thereto, a piston moving in the open end of a cylinder projecting inwardly from the steam-chest cover opposite the valve, and a flexible connection between the piston and the plate, a stem extending from the piston through the steam-chest cover connecting with a second smaller piston, a cylinder within which said piston is movable, and a pipe or passage for the admission of steam beneath said smaller piston to relieve the valve of the weight of the interior plate and piston when the pressure of steam is removed therefrom.

4. A slide-valve movable within a steam-chest, a yoke loosely embracing the valve and confined between flanges on the upper and lower faces thereof, a plate fitting the back of the valve and a stem connecting it with a piston of approximately the same area, movable within a cylinder upon the inner face of the steam-chest cover whereby the pressure of the steam acting upon the piston relieves the valve therefrom, a set-screw adjustable in the steam-chest cover adapted to press upon the center of the piston so as to prevent the valve being lifted from its seat by the upward pressure of exhaust-steam.

In witness whereof I have hereunto set my hand.

GEO. R. HERRICKS.

Witnesses:
GEO. H. STRONG,
S. H. NOURSE.