

(No Model.)

2 Sheets—Sheet 2.

L. J. M. BOYD.
BALANCED SLIDE VALVE.

No. 299,950.

Patented June 10, 1884.

FIG. 3.

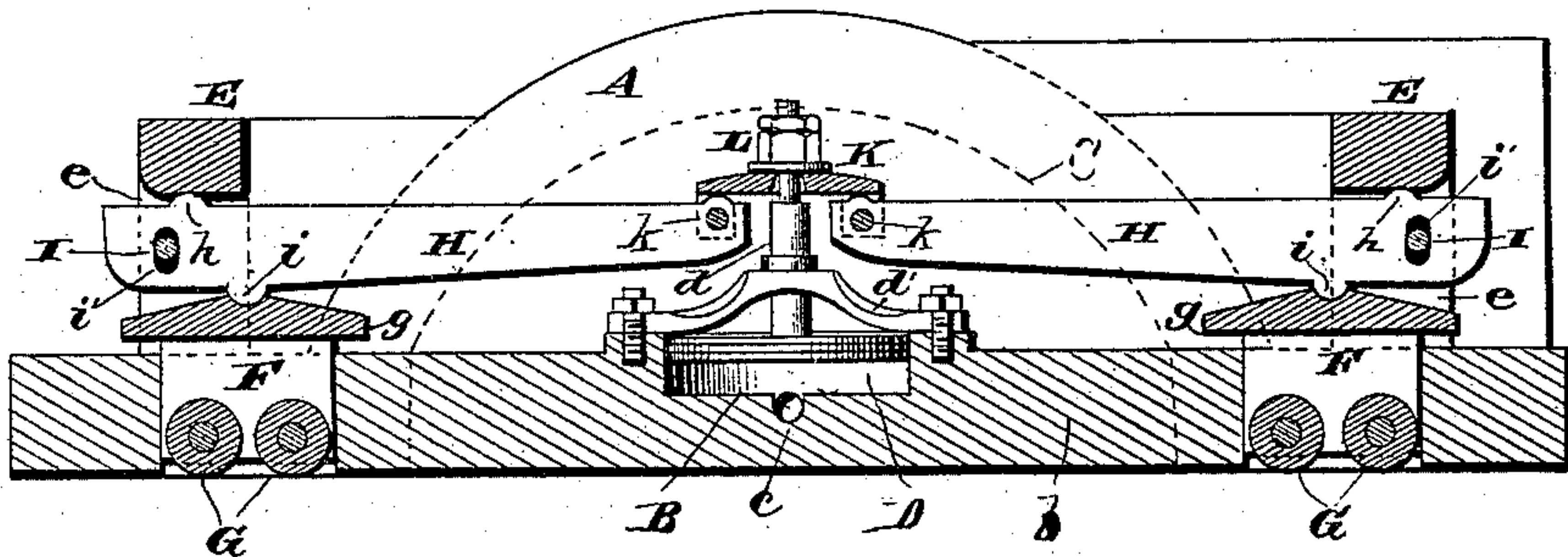
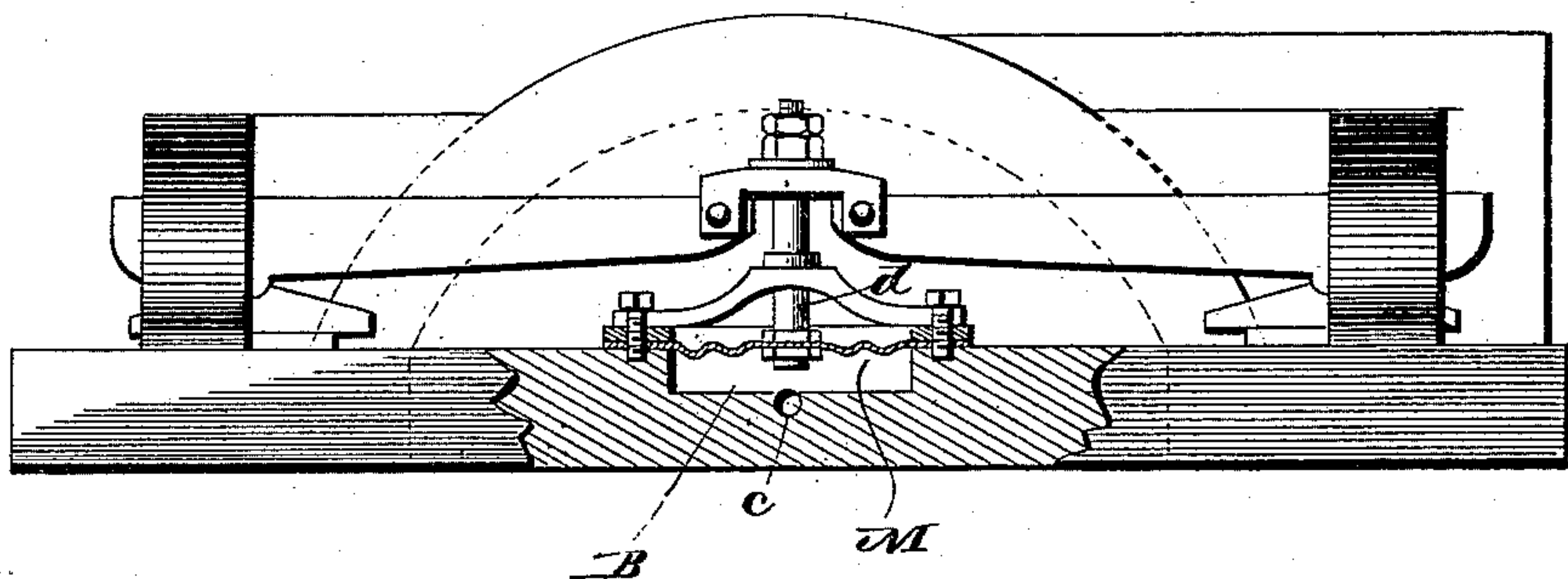


FIG. 4.



WITNESSES

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BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 299,950, dated June 10, 1884.

Application filed January 22, 1884. (No model.)

To all whom it may concern:

Be it known that I, L. JAMES M. BOYD, of Annapolis, in the county of Anne Arundel and State of Maryland, have invented certain new and useful Improvements in Balanced Slide-Valves; and I do hereby 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.

My invention relates to an improvement in balanced slide-valves, the object being to provide a slide-valve with devices for utilizing the pressure of steam to transfer the weight of the valve and steam-pressure exerted thereon upon rollers connected with the valve, and thereby convert the sliding friction into rolling friction, and thus enable the valve to be operated with a minimum expenditure of power, and also lessen the wear on the valve and its seat.

With these ends in view my invention consists, first, in the combination, with a slide-valve having rollers connected therewith, of a piston, plunger, or diaphragm having one side thereof subjected to the pressure of steam and its opposite side in communication with the exhaust-port, and levers for transmitting the motion of the piston, plunger, or diaphragm to the valve, and serving to transfer the weight thereof and the pressure exerted thereon (either in whole or in part) upon the rollers, and thus reduce the friction between the valve and its seat. The invention further consists in features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of the upper side of a slide-valve having one form of my improvement applied thereto. Fig. 2 is a plan view of the under side of the valve. Fig. 3 is a transverse section taken through the piston and levers, and Fig. 4 is a detached view of a modification.

A represents a slide-valve of any approved form and construction, having the T-shaped slot *a* for the reception of the nut on one end of the valve-stem. (Not shown.)

In the side flanges, *b b*, are formed the cylinders *B B*, extending partly through said flanges, and communicating with the cavity *C* of the valve by means of passages *c c*. As the cavity

C is always open to the exhaust-port, it thereby follows that both cylinders are in constant communication with the exhaust-passage of the cylinder. Each cylinder has fitted therein a piston, *D*, provided with a stem, *d*, which is allowed to freely reciprocate within a cross-bar, *d'*, the latter serving to retain the piston against displacement, and insure its ready movement and operation under all conditions.

Upon the flanges of the valve at its corners are cast or secured the brackets *E*, each of which is provided with a slot or opening, *e*. Beneath each bracket, or in close proximity thereto, the flange is provided with an opening, preferably rectangular in form, in which is located a roller-frame, *F*, having chilled-steel rollers *G* journaled therein. The roller-frame is provided with flanges *g g* to retain it in place. The rollers and frame may be made of any desired material and of any form of construction.

H H are levers, the outer ends of which are each provided with a projection, *h*, that engages the bracket *E*, and with a projection, *i*, that engages the roller-frame *F*. A pin, *I*, extends through the bracket and through an oblong hole, *i'*, in the outer end of each lever, the pin simply serving to retain the levers in place. The inner and adjacent ends of the two levers *H H* on each side of the valve are connected to the opposite ends of a yoke, *K*, by the pins *k*, passing through oblong holes in the ends of the levers. Yoke *K* is loosely mounted on the upper end of the stem *d*, and may be regulated in its adjustment by means of the nut *L*.

Upon the admission of the steam to the valve-chest the pressure of steam on the pistons or plungers *D* serves to depress the latter and, through the medium of the levers *H*, elevate the valve slightly, but sufficiently to transfer the pressure exerted thereon and nearly its entire weight upon the rollers *G*, and hence relieve it of the sliding friction to which it is ordinarily subjected, as the sliding friction is by the means described transformed into rolling friction. The rollers at each corner of the valve are arranged to be self-adjustable and move independently of each other. This is effected by the rocking yoke by which the inner ends of the levers *H H* are connected to each other; hence, should

there be any irregularity of valve-seat obstruction on roller-ways, the roller will yield and readily pass over the same without binding or cramping the other rollers, or without raising any portion of the valve. The counterbalancing attachment may be adjusted so as to nicely balance any form or construction of slide-valve by varying the area of the piston or plunger, or the length of the levers H or H, or by the employment of screw-plug valves for regulating the size of the passage communicating with the exhaust-cavity of the valve.

Instead of employing a plunger or piston, I may use a diaphragm in lieu thereof, as illustrated in Fig. 4. In this modified form of construction the cylinder B is covered by a corrugated metallic diaphragm, M, the outer edge of which is tightly fastened to the surrounding flange of the cylinder. To the central portion of the diaphragm is secured the stem *d*. Pressure of steam on the upper face of the diaphragm depresses it and operates the levers in the manner hereinbefore described.

As it is evident that many changes might be made in the construction and arrangement of the levers and in the other features of my improvement without departing from the spirit of my invention, I would have it understood that I do not restrict myself to the particular construction and arrangement of parts shown and described; but,

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

1. The combination, with a slide-valve provided with adjustable bearings, of a piston connected with the valve, and having one side thereof in communication with the exhaust-cavity of the valve and the other side subjected to steam-pressure, and devices for transmitting the motion of the piston to the valve and thereby causing the latter to rest on

its adjustable bearings, substantially as set forth.

2. The combination, with a slide-valve provided with adjustable rollers, of a piston connected with the valve, one side of the piston being in communication with the exhaust-cavity of the valve and the opposite side exposed to steam-pressure, and devices connecting the piston and roller-frames, substantially as set forth.

3. The combination, with a slide-valve provided with adjustable rollers, of a piston connected with the valve and having one side thereof in communication with the exhaust-cavity of the valve and its opposite side exposed to steam-pressure, and levers connected at one end to the piston, and their opposite ends constructed and arranged to engage the roller-frames and brackets on the valve, substantially as set forth.

4. The combination, with a slide-valve provided with adjustable roller-bearings, of a piston connected with the valve, and levers arranged with their outer ends engaging the roller-frames, and their inner ends connected to a rocking yoke on the piston-stem, substantially as set forth.

5. The combination, with a slide-valve constructed with cavities, each provided with a passage leading to the exhaust-cavity of the valve, and piston fitted to said cavities, of adjustable roller-frames fitted in openings at the corners of the valve, and levers connecting said piston and roller-frames, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS JAMES MASSEY BOYD.

Witnesses:

A. S. BRYAN,
J. T. JEFFERSON.