(No Model.) 2 Sheets—Sheet 1.

R. E. VANDEVENTER.

BALANCED SLIDE VALVE.

No. 462,518. Patented Nov. 3, 1891.

Fig: 1.

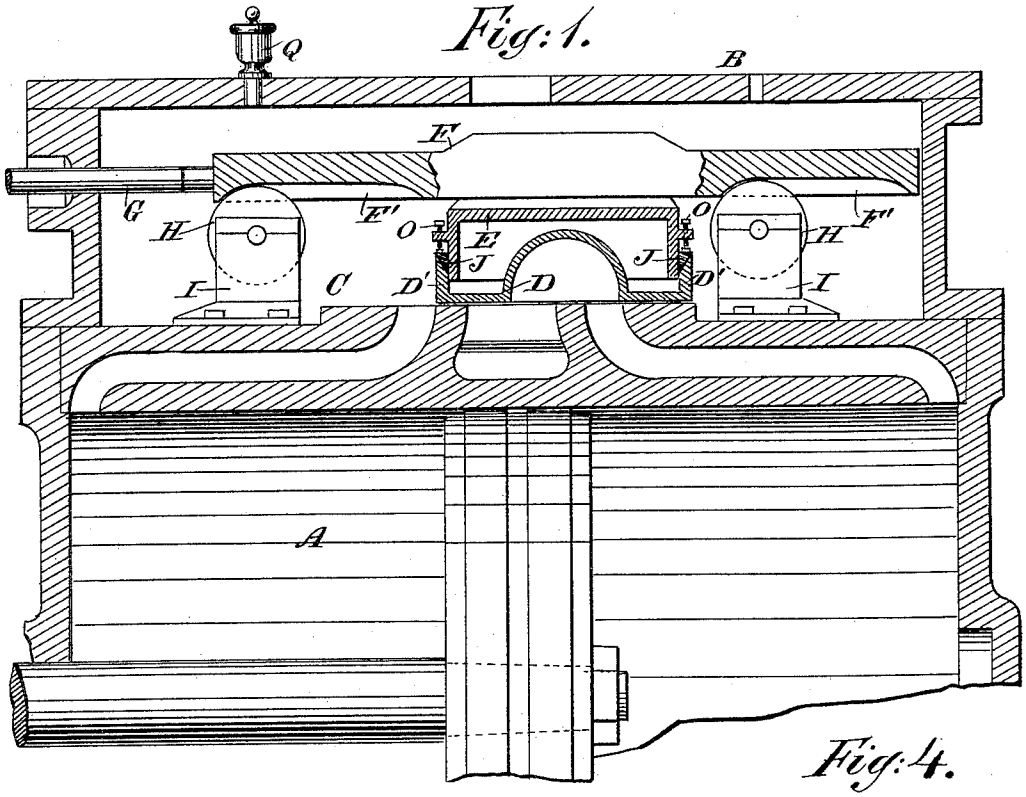
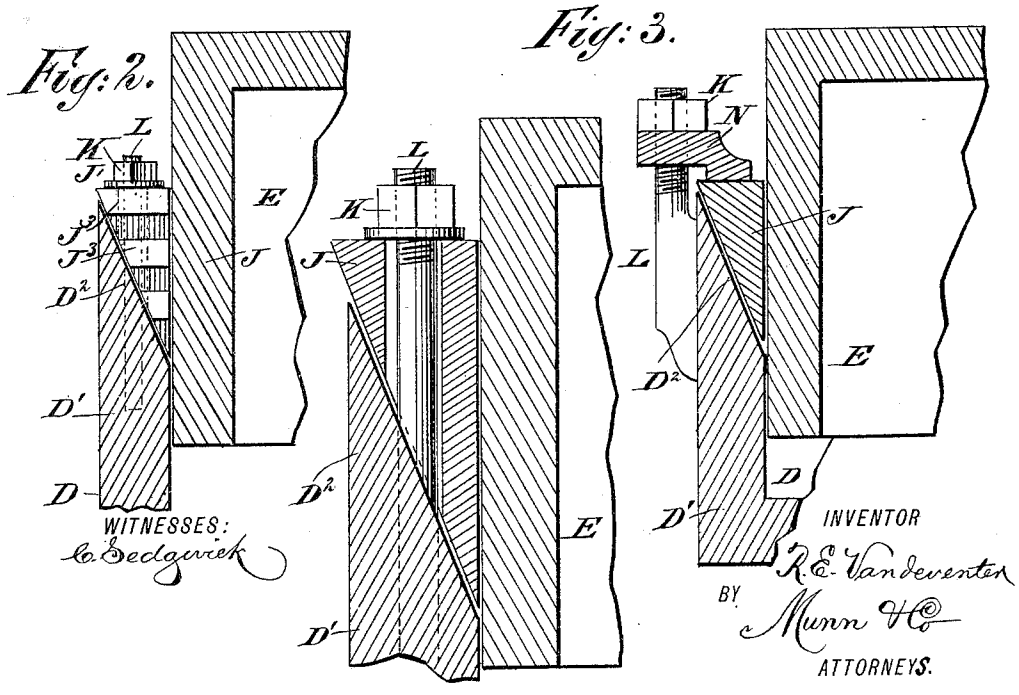


Fig: 4.

Fig: 3.

Fig: 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

R. E. VANDEVENTER.

BALANCED SLIDE VALVE.

No. 462,518. Patented Nov. 3, 1891.

Fig: 6.

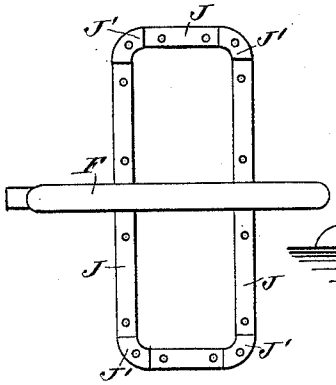


Fig: 5.

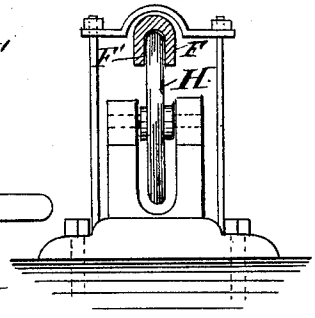


Fig: 7.

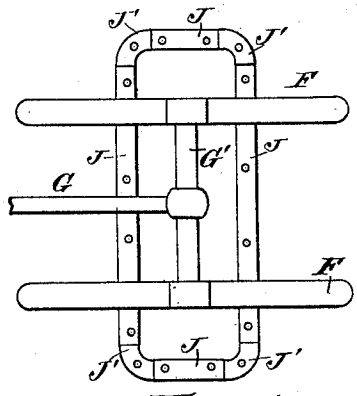


Fig: 8.

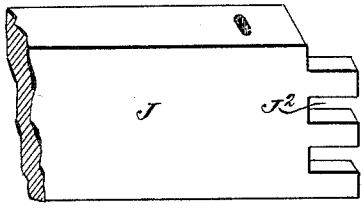


Fig: 9.

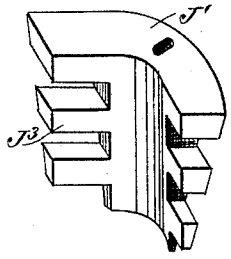


Fig: 10.

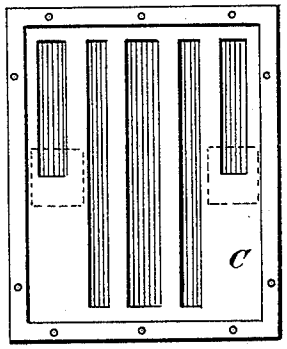


Fig: 11.

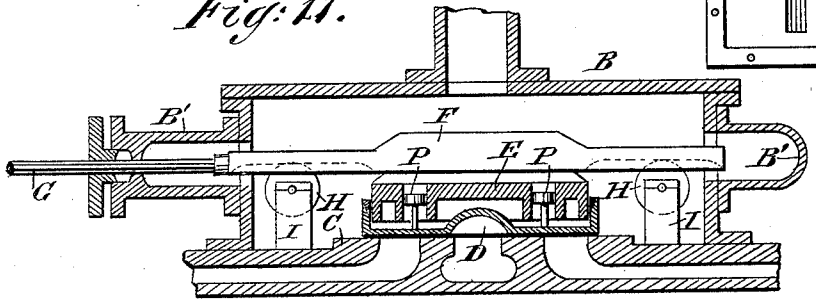
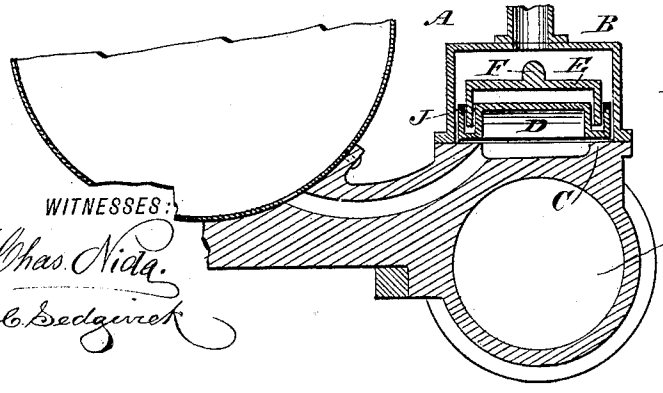


Fig: 12.



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UNITED STATES PATENT OFFICE.

ROLAND E. VANDEVENTER, OF MOUNT STERLING, ILLINOIS.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 462,518, dated November 3, 1891.

Application filed May 27, 1891. Serial No. 394,246. (No model.)

To all whom it may concern:

Be it known that I, ROLAND E. VANDEVENTER, of Mount Sterling, in the county of Brown and State of Illinois, have invented a new and Improved Balanced Slide-Valve, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved slide-valve for steam-engines, which is simple and durable in construction, reduces the friction to a minimum, and permits an easy adjustment relative to its seat.

The invention consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement as applied. Fig. 2 is an enlarged sectional side elevation of one corner of the improvement. Fig. 3 is a sectional side elevation of part of the improvement. Fig. 4 is a similar view of a modified form of the same. Fig. 5 is an end elevation of the roller and part of the yoke, the latter being in section. Fig. 6 is a plan view of the improvement. Fig. 7 is a like view of a modified form of the same. Fig. 8 is a perspective view of one of the packing-strips. Fig. 9 is a like view of a corner packing-strip. Fig. 10 is a plan view of a valve-seat of modified form. Fig. 11 is a sectional side elevation of a modified form of the improvement as applied, and Fig. 12 is a transverse section of the same.

The engine on which the improvement is applied is provided with the usual cylinder A, carrying the steam-chest B, containing the valve-seat C, with the usual ports over which operates the valve D, as plainly shown in Fig. 1. The valve D is connected with a yoke E, made in the shape of an inverted box and fitting with its sides onto the inner surface of the upwardly-extending sides D′ of the valve D, as plainly shown in Fig. 1.

The top of the yoke E supports a longitudinally-extending bar F, connected with the valve-stem G, passing through one end of the steam-chest B to connect in the usual manner with mechanism actuated from the driving-shaft of the engine.

The bar F is formed on its under side with longitudinally-extending grooves F′, arranged one near each end and each engaged by a roller H, journaled in a suitable support I, secured in the steam-chest B. Thus when a sliding motion is given to the valve-stem G the bar F, supporting the yoke E, is moved forward and backward, traveling on the rollers H, so that the slide-valve D is moved in a like direction by the yoke E, carrying the valve along.

As shown in Fig. 7, a series of bars F may be secured to the yoke E and mounted each upon rollers H, the valve-stem G thus being connected by a cross-bar G′ with two adjacent bars F, as shown. In order to insure a steam-tight joint between the sides of the box-shaped yoke E and the sides D′ of the valve D, packing-strips J are employed beveled on their under side to engage corresponding bevels D^2, formed on the sides D′ of the valve D. (See Figs. 2, 3, and 4.)

The packing-strips J are pressed onto the beveled seats D^2 by nuts and washers K, screwing on bolts L, held in the sides D′, the said bolts passing through elongated apertures in the strips. It will be seen that the inner surfaces of the packing-strips engage firmly the outer surface of the sides of the yoke E, while the beveled bottoms rest on the beveled seats D^2 of the sides D′. Instead of using the nut K, an arm N may be employed for pressing the packing-strips in contact with the yoke and valve D, as illustrated in Fig. 4. The arm N is held in this case on a bolt L, secured to the outer surface of the side D′, and having its nut K screwed onto the arm N.

In order to prevent the valve D from being unseated on the valve-seat C by back-pressure in the cylinder, set-screws O are provided screwing in lugs on the sides of the yoke E, the lower ends of the said set-screws being about one-eighth or three-sixteenths of an inch above the packing-strips J, so that when a pressure is exerted against the under side of the valve D the latter cannot move upward, as the said packing-strips abut against the said screws O. As the lower ends of the

screws are above the packing or the valve D, the weight of the yoke E is wholly carried by the rollers, and as these rollers or the parts resting on them wear away the yoke will be permitted to sink down in the valve without throwing its weight thereon, which would defeat the very purpose of the invention.

In order to insure a steam-tight joint at the corners of the valve D and the yoke E, corner packing-strips J′ are employed (shown in Fig. 9) and are wedge-shaped similarly to the strips J. The latter, as well as the corner strips J′, are formed with the tongues and grooves J^2 and J^3, respectively, adapted to engage one another, so as to insure a tight-fitting joint.

If it is deemed necessary to hold the valve D firmly on the seat C by the pressure of the live steam within the steam-chest B, additional pistons P may be employed, as shown in Fig. 11, the said pistons extending in correspondingly-shaped openings formed in the top of the yoke E, so that the said pistons are exposed to the pressure of the live steam in the steam-chest, and thus assist in holding the valve D on its seat. The yoke F is prevented from being displaced on the rollers H by suitable cross-guards supported on posts, as shown in Fig. 5.

If the device is applied on engines already in use, the steam-chest may be constructed as shown in Fig. 11, having extensions B′ at the ends to permit the ends of the bar F to pass into the same at the forward and backward movement of the valve. If the steam is admitted to the steam-chest B from underneath, as shown in Fig. 10, then the bearings I are preferably arranged at the sides of the inlet-ports, as indicated in dotted lines in said Fig. 10.

It will be seen that a valve constructed in this manner glides freely over its valve-seat, being only held to its valve-seat by the pressure of the live steam on the sides D′, so that the friction is reduced to a minimum. The wear of the valve D or the bar F traveling on the rollers H is readily taken up, so that the relative positions of the several parts and their operation are not disturbed. In the top of the steam-chest B are arranged oil-cups Q, located in such a manner as to lubricate the bearings and rollers H.

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

1. The combination, with the valve D, having vertical sides D′, the upper edges of which are beveled downward and inward, as at D^2, and the inverted-box-like yoke E, mounted within the sides D′, of the wedge-shaped packing J, filling the space between the beveled edge D^2 and the outer sides of the yoke E, and means for adjusting the packing, substantially as set forth.

2. The combination, with the valve D, having vertical sides D′, beveled inward and downward around its upper edge, bolts L, projecting upward from said beveled edge D^2, and the inverted-box-like yoke E, mounted within the sides D′, of the wedge-shaped packing J, having slots through which the bolts pass, and nuts on the bolts pressing the packing into the space between the beveled edge D^2 and the outer sides of the yoke, substantially as set forth.

3. The combination, with the valve-chest and the valve-seat and longitudinally-aligned rollers H, journaled in front and rear of the valve-seat, of the valve D, sliding on said seat and having vertical sides, an inverted-box-like yoke E within the sides, an interposed packing, and a longitudinally-extending bar F, resting at its ends on the rollers and connected between its ends to the yoke to support the same, substantially as set forth.

4. The combination of the rollers in front and rear of the valve-seat and the inverted-box-like yoke having a longitudinally-extending supporting-bar F, provided with grooves F′ F′, receiving the upper parts of the rollers, with the slide-valve D, having vertical sides inclosing the side walls of the box-like yoke and beveled inward and downward at their upper edges, wedge-shaped packing in the space thus formed, and bolts and nuts for adjusting the packing, substantially as set forth.

5. The combination, with the slide-valve and its side walls D′ beveled inward and downward at their upper edges, of the box-like yoke fitting within the said side walls and having a supporting-bar mounted on rollers, the wedge-shaped packing in the space formed by said bevel, and vertical set-screws O on the outer sides of the said yoke, with their lower ends projecting near to the upper edge of said packing or wall D′, but out of contact therewith, substantially as set forth.

6. The combination, with the slide-valve having the vertical bolts L on its inward beveled upper edge D^2, the wedge-shaped packing J and J′, having mortise-and-tenon connections J^2 J^3 and provided with vertical bolt-slots, through which said bolts pass, and the nuts holding the packing down, of the inverted-box-like yoke E, mounted within the sides D′ and said packing and provided with a bar having supporting-rollers, substantially as set forth.

ROLAND E. VANDEVENTER.

Witnesses:
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A. HOFFMANN.