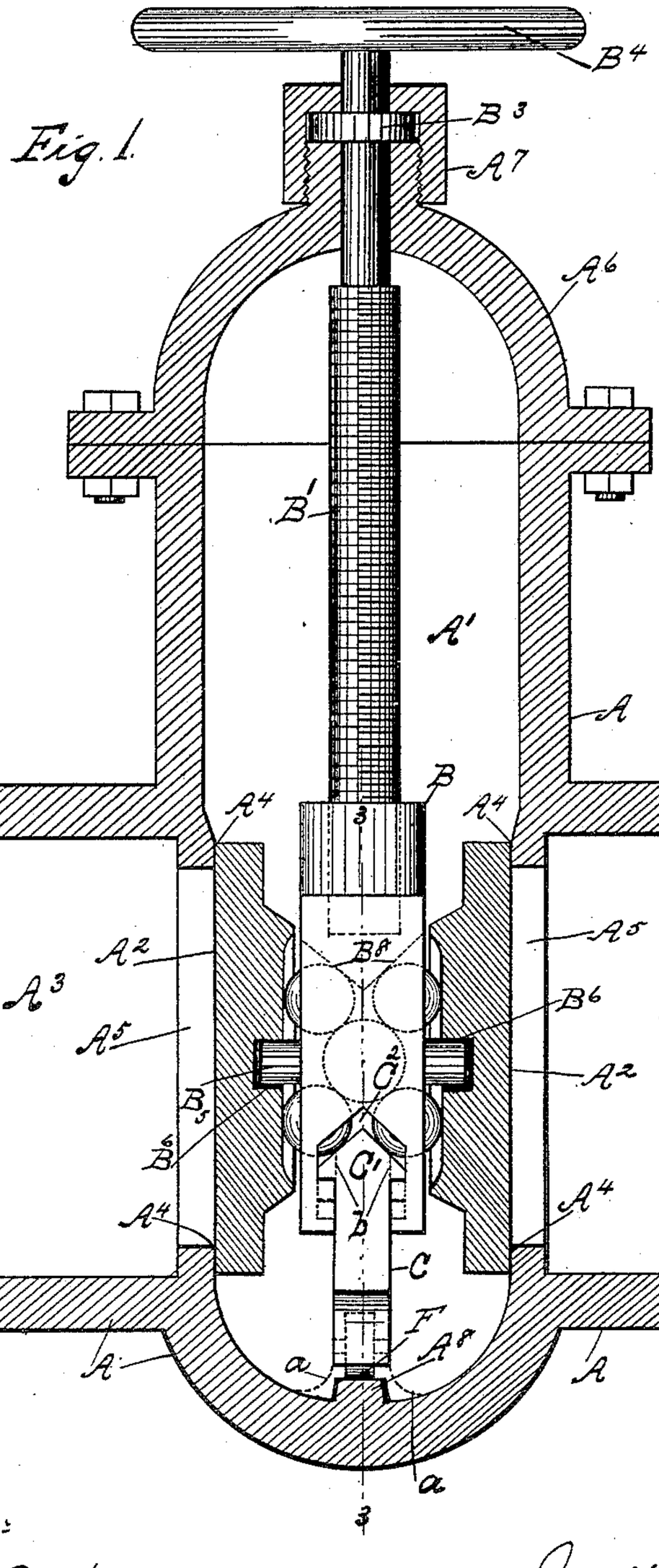
(No Model.) 3 Sheets—Sheet 1.

W. ROSS.

SLIDE GATE VALVE.

No. 442,458. Patented Dec. 9, 1890.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

W. ROSS.

SLIDE GATE VALVE.

No. 442,458. Patented Dec. 9, 1890.

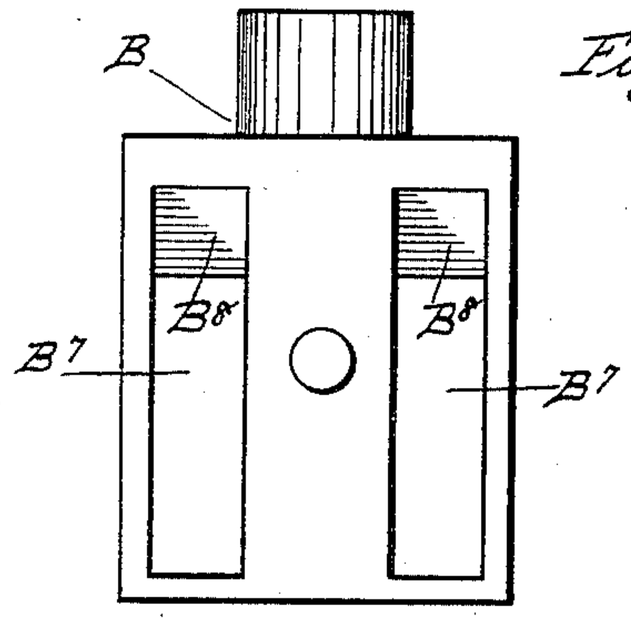
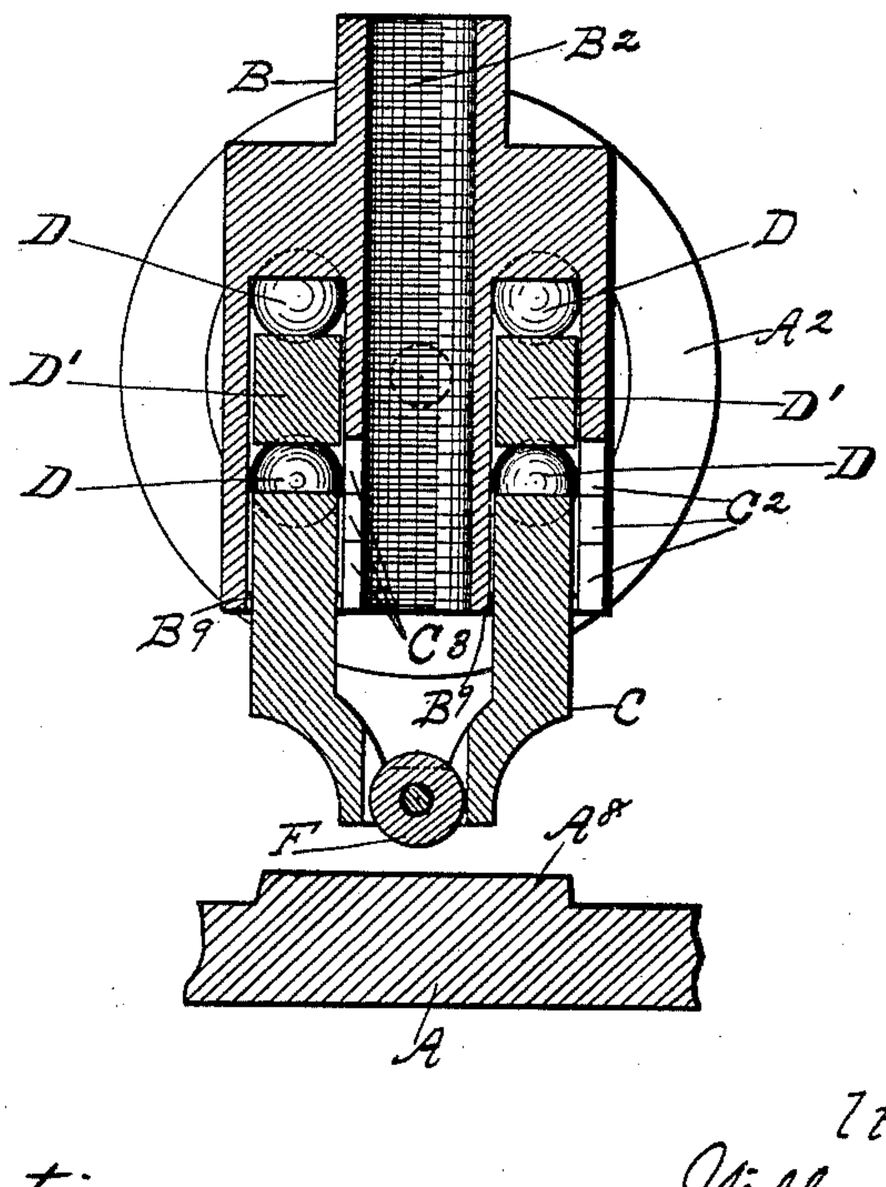


Fig. 2.

Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

W. ROSS.

SLIDE GATE VALVE.

No. 442,458. Patented Dec. 9, 1890.

Fig. 6

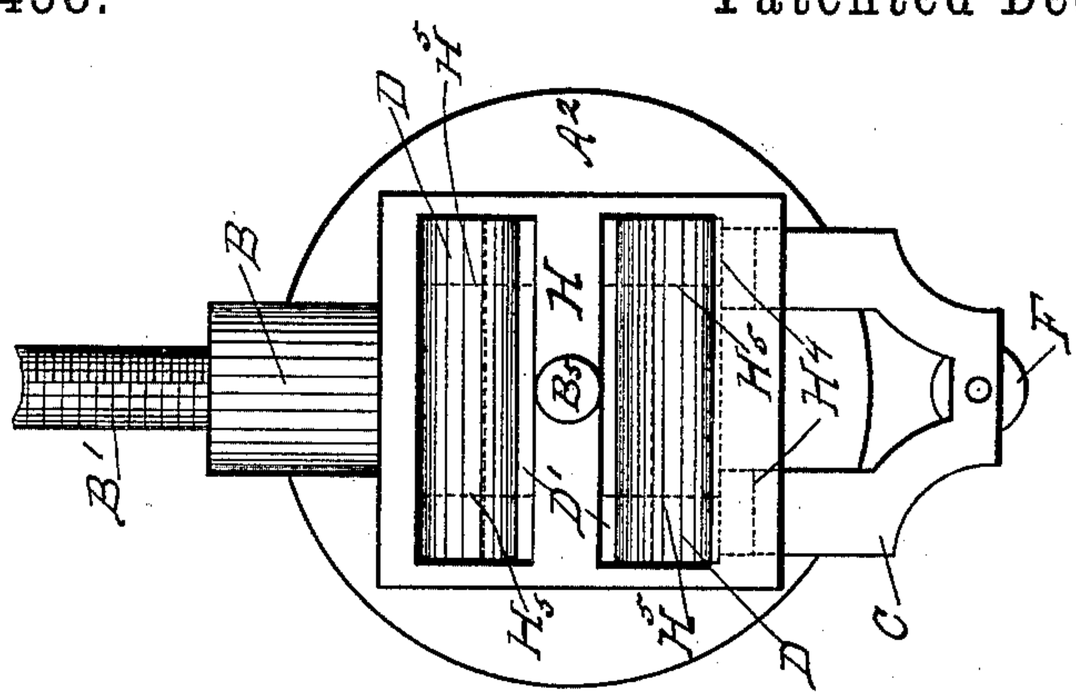


Fig. 5.

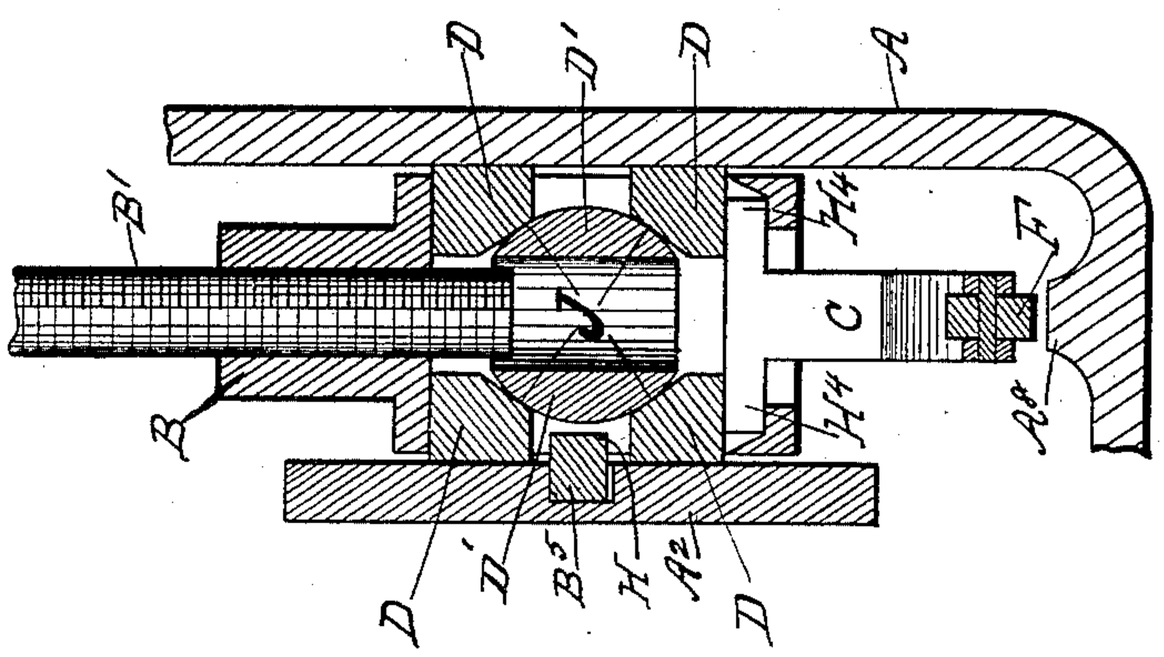
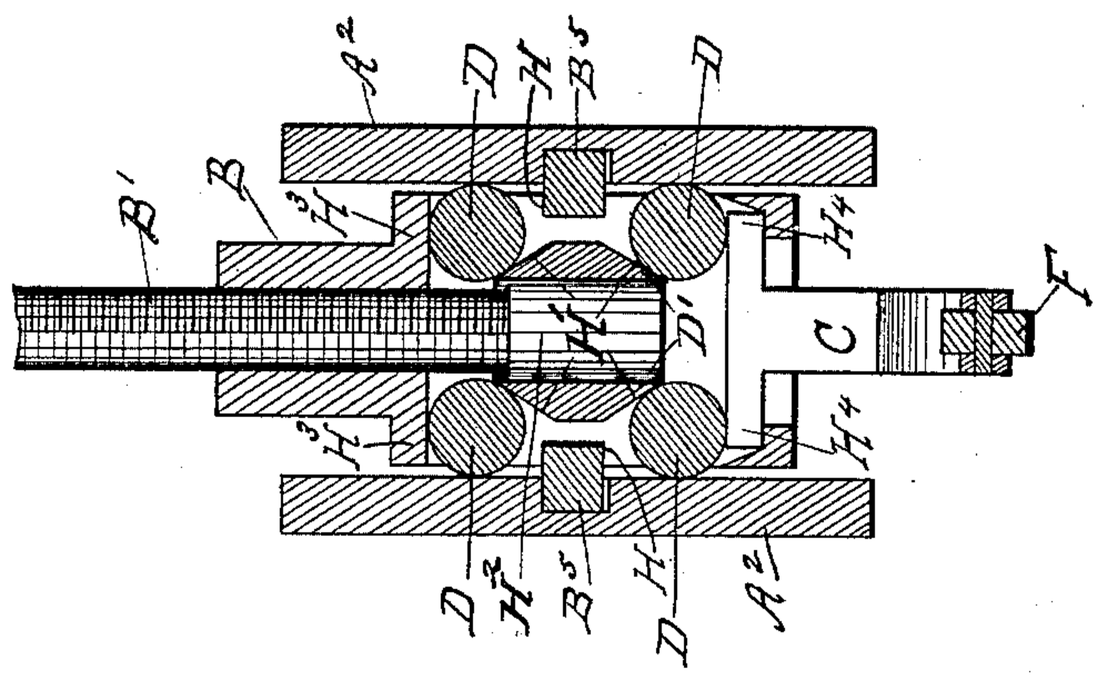


Fig. 4.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM ROSS, OF TROY, NEW YORK, ASSIGNOR TO THE ROSS VALVE COMPANY, OF SAME PLACE.

SLIDE-GATE VALVE.

SPECIFICATION forming part of Letters Patent No. 442,458, dated December 9, 1890.

Application filed August 2, 1890. Serial No. 360,758. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ROSS, a citizen of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Slide-Gate Valves, of which the following is a specification.

My invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures therein.

Figure 1 of the drawings is a central vertical section of my improved valve, showing the gate-carrier in side elevation. Fig. 2 is a side elevation of the gate-carrier detached, and viewed in the direction right angular to the line of view in Fig. 1. Fig. 3 is a central vertical section of the carrier and gate-seating mechanism, taken on the broken line 3 3 in Fig. 1, showing one of the gates in rear elevation. Figs. 4 and 5 are views, similar to that shown in Fig. 1, of modifications. Fig. 6 is a side elevation of the gate-carrier shown in Fig. 4 detached, with one of the gates in position and the other removed.

A is the valve-case, which is provided with a chamber A', in which the gates A^2 are adapted to slide transversely across the water-channel A^3 to and from their respective seats A^4, surrounding the oppositely-located channel-openings A^5 in the chamber-walls. The gates are supported by a carrier B, which may be moved across the water-channel in any known manner, as by the screw-stem B', fitting a correspondingly-screw-threaded central aperture B^2 in the carrier, and held in a longitudinally fixed position by the collar B^3, fixed upon the stem and supported by the detachable screw-threaded cap A^6 and gland-nut A^7. One end of the stem projects exteriorly of the valve-case, and is provided with an operating-handle B^4. The gates are connected with the carrier by trunnion-supports, the trunnions B^5 being fixed upon the carrier and severally adapted to enter and loosely fit a socket B^6, one in the back of each gate. When desired, the trunnions may be fixed to the gates and the sockets located in the carrier. The carrier is also provided with two open chambers B^7, respectively located on opposite sides of the central screw-threaded stem-aperture. Each of the chambers is provided with a wedge-shaped end wall having on opposite sides the inclines B^8. (Shown by solid lines in Fig. 2 and by dotted lines in Fig. 1.) The end walls of the chambers, which are located opposite the wedge-shaped ends, are each provided with a central aperture B^9, adapted to receive one arm of the bifurcated plunger C. Each arm of the plunger is provided with a wedge-shaped head C' similar in form to the wedge-shaped end walls of the chambers. When the bifurcated arms are in position in the aperture B^9, the wedge-shaped heads rest within the chambers, one at the end of each chamber opposite the wedge-shaped end wall of that chamber.

To facilitate the insertion of the plunger-arms and the wedge-shaped heads within their respective chambers, I provide the outside wall of one of the chambers with an opening C^2, connecting with the central opening B^9 and adapted to receive one of the plunger-arm heads, and the inside wall of the other, which separates the chamber from the central screw-threaded aperture, with a similar opening C^3, adapted to receive the head of the other plunger-arm. The plunger arms and heads are inserted through such openings to the position shown in Figs. 1 and 3. The carrier is then placed upon the back of one of the gates, with the trunnion in the trunnion-sockets, thereby closing one of the open sides of each carrier-chamber, and a nest of bearing-blocks, balls, or rollers inserted in each chamber in the position shown in Figs. 1 and 3. I have shown four metallic balls D, two at each end of the chambers, and a metallic roller D' in the center of each chamber in engagement with the four balls. After the balls and rollers are inserted in the chambers the other gate is placed on the carrier in the relative position shown in Fig. 1, and the gates and carrier inserted in the main chamber A', where the gates are held upon their supporting-trunnions and in a position to retain the

balls and rollers in their respective chambers by the chamber-walls of the valve-case. The carrier and gates are moved from one end of the main chamber to the other by rotating the screw-stem in the usual manner, to open and close the channel, the gates hanging upon their supporting-trunnions.

In closing or seating the gates the plunger C travels with the gate-carrier toward the bottom of the main chamber until its lower end strikes the rib or flange A^8, which arrests the progress of the plunger. The farther movement of the carrier forces the wedge-shaped plunger-head against the lower pair of balls, and the wedge-shaped carrier-abutment against the upper pair of balls, as will be apparent from an inspection of Fig. 1. The movement may be continued until each one of the balls in each chamber bears upon one of the gates, the carrier-abutment, the plunger-head, and central rollers forcing the gates closely to their seats.

I am aware that a wedge-shaped carrier and wedge-shaped plunger have heretofore been employed in connection with wedge-shaped seating-blocks to seat the gates; but in such a form of construction the seating-pressure was not evenly distributed along the gate-seats, whereby it frequently happened that one side or edge of a gate might not be brought into engagement with its seat, the opposite edge of the gate being first seated and resisting the entire seating-pressure. Such a form of construction required accurate fitting of the parts, and was not adapted to accommodate itself to the change of form resulting from wear, or to distribute the pressure equally over the whole seating surfaces of the gates. A slight obstruction at one part of such surface might disturb the balance of the seating-blocks and be able to resist the seating-pressure, and render it impossible to tightly close the gates.

I have ascertained that by interposing between the seating-blocks which come in contact with the oppositely-located gates a mobile block bearing upon both of such gates with its freedom of movement in a plane intersecting the contact-blocks, limited by such blocks only, I am able to communicate through such mobile block a uniform pressure to both gates at the points of contact between the bearing-blocks and their respective gates. The balls D are the seating-blocks and the roller D′ is the mobile block. By means of these nests of five blocks, one in each chamber, connected by the bifurcated seating-plunger, I am able to apply the seating-pressure at four points on the back of each gate and to distribute the pressure equally between such points. Any variation or irregularity in the form of the various parts due to wear or the expansion and shrinkage in casting is readily compensated for by the mobile block, which changes its position as required to distribute the pressure.

By applying the seating-pressure at four points on the back of the gates the gates do not tip on their seats or wear unevenly, but tightly close the whole channel-opening.

To facilitate the equal distribution of the seating-pressure between both nests of blocks in the two carrier-chambers, I provide the lower end of the seating-plunger with a shank, which is adapted to have a laterally-yielding movement after it strikes the bottom of the valve-case.

As a preferred form of construction, I have shown a wheel or roller F, journaled in the foot of the shank, to engage with the rib or flange A^8 on the interior of the case-bottom. If one edge of the gate should happen to be thicker than its opposite edge, the movements of the plunger-shank and mobile block will cause the pressure to be evenly distributed to the four contact-points of the blocks on the backs of the gates.

When desired, one gate may be dispensed with, the channel-opening closed by that gate being located elsewhere, and the chamber-wall affording a resisting medium or bearing for the nests of balls on that side opposite the single gate to be seated, as indicated in Fig. 5.

I prefer to employ bearing-blocks with cylindrical or spherical surfaces, as shown in Fig. 1, as such form affords the least frictional resistance to their movements in evenly balancing and distributing the seating-pressure; but bearing-blocks with plane bearing-surfaces, as shown in Figs. 4, 5, and 6, may be employed.

The trunnion-sockets are made a little larger than the trunnions, so that the movements of the carrier may be continued for a short distance after the gates have come into engagement with their seats to increase the seating-pressure without sliding the gates across their seats after the pressure has become sufficient to injure the seating-surfaces by a slide movement, and when the gates are opened or unseated a slight independent movement of the carrier and trunnions backward in their sockets relieves the gates of most of the seating-pressure and permits them to be slid from their seats without injury to the latter.

In Figs. 4 and 6 I have shown the gate-carrier provided with a single chamber and the bearing-blocks D in the form of rollers, which respectively extend across the opposite edges of each gate. The trunnions are supported by the cross-bars H. The central mobile block D′ is made to correspond in length with the rollers and provided with the plane beveled surfaces H′, adapted to respectively engage with the four rollers D. The mobile block is also provided with a central aperture H^2, adapted to permit the carrier-stem to pass loosely through the same as the carrier travels up the stem. The aperture is made somewhat larger than the stem to afford the block freedom of movement without coming in contact with the stem. The bearing-block abut-

ment H^3 on the carrier may be provided with a plane horizontal surface to engage the bearing blocks or rolls, instead of wedge-shaped, as shown in Fig. 1, and the plunger-heads H^4 may each have a similar surface to engage the lower pair of rolls, the beveled surfaces of the mobile block sufficing to transmit the seating pressure through the rolls to the gates.

It is obvious that the rolls D and block D′ of Fig. 4 may be cut transversely, as indicated by the dotted lines H^5 in Fig. 6, in which case the several sections would form nests of bearing-blocks similar to those shown in Fig. 1.

In Fig. 5 the bearing-blocks D are provided with beveled surfaces J, adapted to engage with the central mobile block D′. The bearing-blocks engage with a plane abutment on the carrier and a plane head on the seating-plunger, as shown in Figs. 4 and 6. One pair only of the seating-blocks engage with a gate, the other pair engaging with the valve-case A, (shown only in part,) which affords a resisting medium to distribute the seating-pressure upon the back of the single gate.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a slide-gate valve, the combination, with the inclosing-case, a slide-gate, a gate-carrier having a bearing-block-engaging abutment, and a carrier-stem projecting exteriorly of the case, of a seating-plunger, a nest of bearing-blocks interposed between such gate and a resisting medium comprising two pairs of bearing-blocks, one pair bearing upon the gate and the other pair upon the resisting medium, and a mobile block interposed between the pairs, substantially as described.

2. In a slide-gate valve, the combination, with the inclosing-case, a slide-gate, a gate-carrier having a bearing-block-engaging abutment, and a carrier-stem projecting exteriorly of the case, of a seating-plunger provided with a laterally-yielding foot, a nest of bearing-blocks interposed between such gate and a resisting medium comprising two pairs of bearing-blocks, one pair bearing upon the gate and the other pair upon the resisting medium, and a mobile block interposed between the pairs, substantially as described.

In testimony whereof I have hereunto set my hand this 28th day of July, 1890.

WILLIAM ROSS.

Witnesses:
GEO. A. MOSHER,
W. H. HOLLISTER, Jr.