(No Model.)

2 Sheets—Sheet 1.

J. M. EADS.

IRRIGATION HEAD GATE.

No. 550,711. Patented Dec. 3, 1895.

Fig. 1.

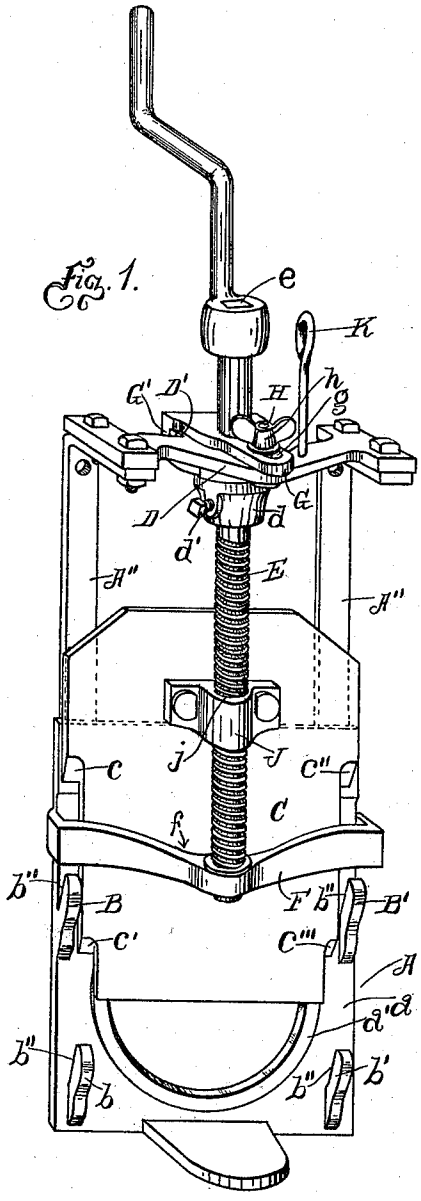
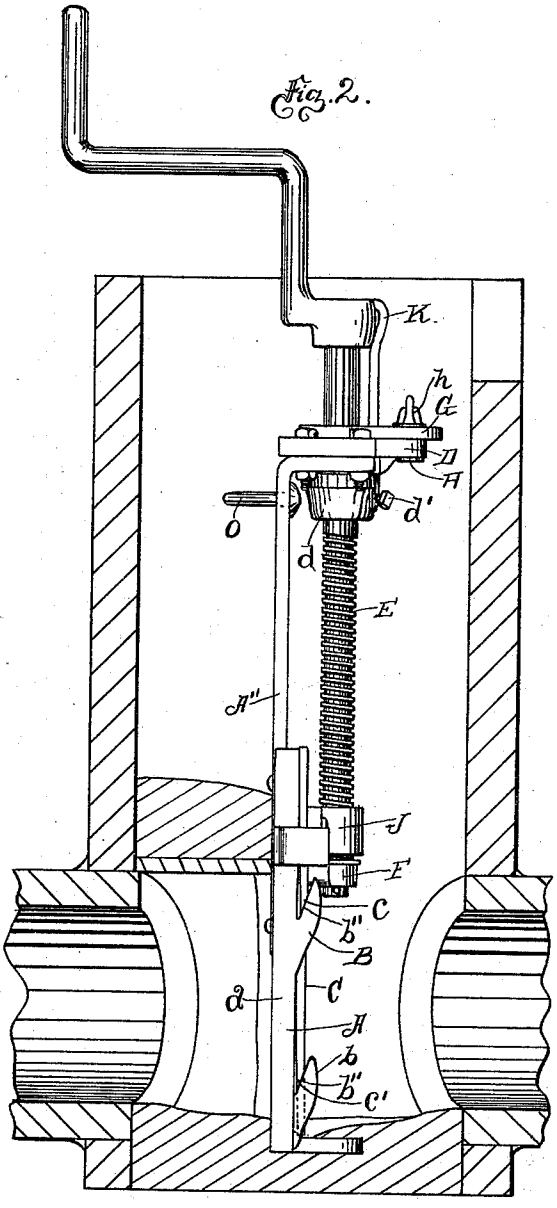


Fig. 2.



Witnesses.

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Alfred L. Townsend.

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(No Model.) 2 Sheets—Sheet 2.

J. M. EADS.

IRRIGATION HEAD GATE.

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Fig. 3.

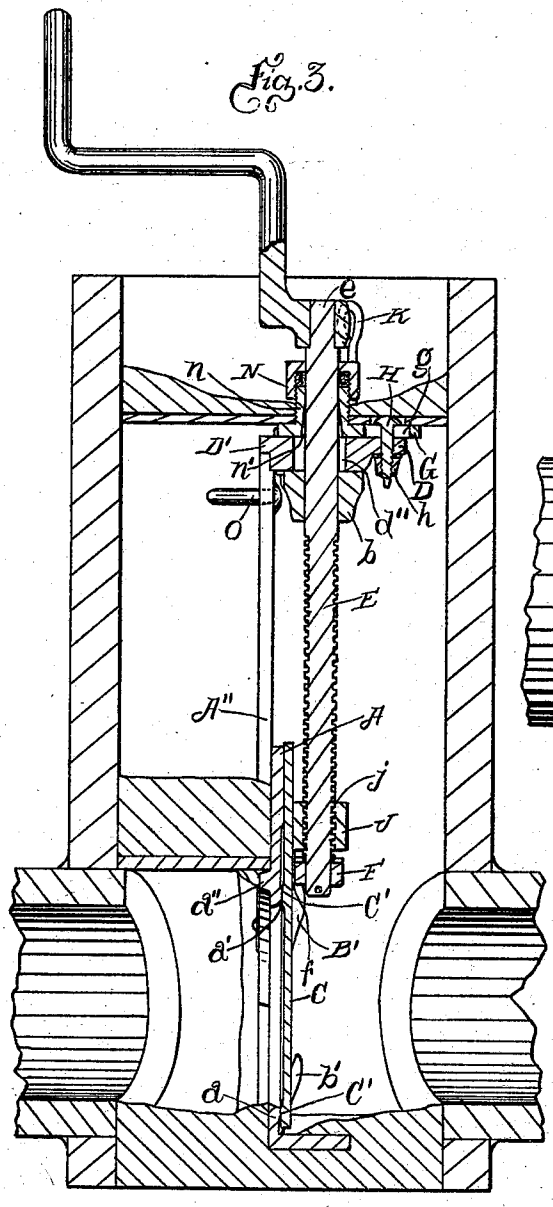


Fig. 4.

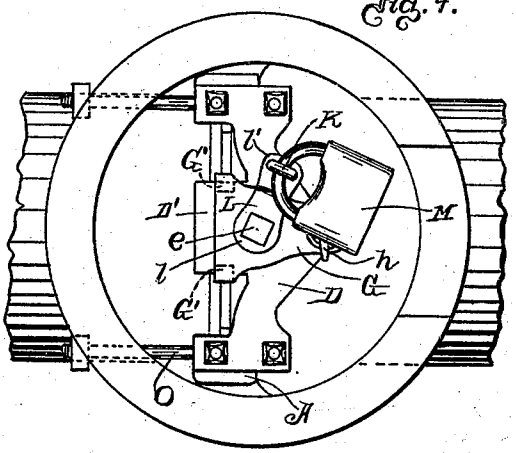
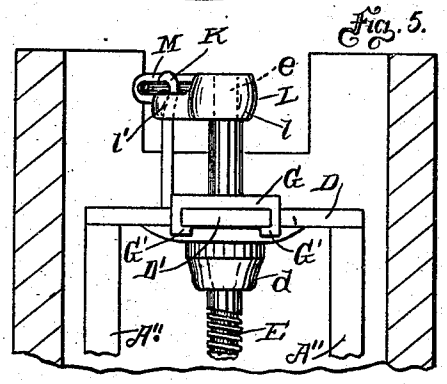


Fig. 5.



Witnesses.
P. W. Harbeson.
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UNITED STATES PATENT OFFICE.

JAMES MARION EADS, OF SAN BERNARDINO COUNTY, CALIFORNIA.

IRRIGATION HEAD-GATE.

SPECIFICATION forming part of Letters Patent No. 550,711, dated December 3, 1895.

Application filed March 26, 1895. Serial No. 543,220. (No model.)

To all whom it may concern:

Be it known that I, JAMES MARION EADS, a citizen of the United States, residing in San Bernardino county, near the city of Pomona, Los Angeles county, in the State of California, have invented new and useful Improvements in Irrigation Head-Gates, of which the following is a specification.

My invention relates to those gates which are used chiefly in the main lines of pipe of irrigation systems for the purpose of cutting off a part or all of the water flowing in such pipe-line and diverting it so it may be used for irrigation.

In southern California the question of irrigation is one of primary importance, for the reason that water is comparatively scarce and reaches an exorbitant price in comparison with the price of land. Therefore it becomes highly essential that the head-gates used for diverting water be of such construction as to avoid all leakage or waste. Heretofore it has been customary to employ slide-valves for this purpose; but as ordinarily constructed these valves have serious objections. The most important objection is that these valves as heretofore constructed cannot be made to fit tight, for the reason that if they are fitted too tight fine sand will get in the grooves and will clog the same and prevent the slide from closing the valveway. For this reason it has been customary to make the slide-grooves of greater width than the valve-slide and to depend upon the pressure of the water against the valve to force the valve-slide against its seat to thereby prevent leakage of water between the valve and its seat. Ordinarily these valves are used in pipe-lines made of cement, and the pressure of the water is not sufficient to force the slide against the seat with sufficient force to prevent leakage, and consequently a large amount of water is thereby wasted—that is to say, it passes through the head-gate when it should not.

In order to avoid any binding or cramping of the valve-slide in the grooves, I arrange my valve-slide upon one face of a plate provided with adischarge-opening and a valve-seat surrounding such opening, and provide the slide-grooves in short detached sections arranged in lugs projecting from the face of the plate, and I operate such slide by means of a nut secured to the rear of the slide and arranged to travel along a screw-stem also arranged at the rear of the slide. By this construction it becomes difficult to cause the valve-slide to seat perfectly upon its seat without buckling or cramping, a slight deviation of the screw from a right line making the parts bind and cramp in a highly-objectionable manner.

The object of my invention is to overcome these objections and to produce a slide-valve which will be simple in its construction and which will be so arranged as to tightly force or wedge the valve-slide against its seat when the valve is fully closed, and to release the valve from this wedging action and to allow it to swing outward practically free from contact with the valve-seat while the valve is being opened or closed thus to avoid friction and at the same time to make an absolutely-tight closure of the valve irrespective of the pressure of the water against the valve-slide; also, to so construct the gate that sand or gravel will not interfere with its perfect operation.

One object of my invention is to produce a valve of this class in which the valve-slide may be quickly and accurately seated upon its seat; also, to provide for lightness and simplicity in the contrivance for operating the valve-slide.

My invention comprises a slide-valve having its valve-slide operated by a screw-stem having one end journaled in an adjustable journal-bearing to allow the stem to be moved toward or from the plane of the valve-seat, thus to seat the valve-slide perfectly upon the valve-seat.

My invention also comprises a slide-valve having its slide-grooves arranged in detached sections, each section being inclined at an angle with the plane of the valve-seat and a slide-valve arranged to enter the grooves and to be wedged thereby firmly against the valve-seat.

My invention also comprises the various features of construction and combinations of parts whereby I am enabled to carry my invention into practical operation.

The accompanying drawings illustrate my invention.

Figure 1 is a perspective front view of my improved valve with the slide partially open.

Fig. 2 is a side elevation of the same, showing the slide fully closed. Fig. 3 is a vertical mid-section showing my improved valve arranged for use under pressure. Fig. 4 is a plan view of my improved device, showing the screw-stem in its locked position. Fig. 5 is a fragmental detail showing a rear view of the screw-adjusting mechanism.

In the drawings, A represents the frame of my improved slide-valve. This frame comprises a lower portion *a*, which is provided with a valve-seat *a'* and with lugs or projections B B' *b b'*, arranged upon opposite sides of such valve-seat and in which are provided the valve-slide grooves *b''*, which are arranged to receive suitable lugs *c c'*, &c., which are arranged upon the slide C and which will hereinafter be more particularly described. To this lower frame is secured by suitable means the upper support D, which serves to support the screw-stem E, which operates the slide C. To the lower portion *a* of the head-gate frame is rigidly attached an arm or cross-bar F, which extends from one side of the frame to the other and is arranged to leave a slot *f* between the arm and the frame, in which slot the slide C is arranged to reciprocate. The lower end of the screw-stem E is journaled in the arm or bar F, which also serves as a guide for the valve-slide, and the upper portion of the screw-stem is journaled in the upper support D and is prevented from being withdrawn from its journals by means of a collar *d*, which is arranged upon the screw-stem below the upper support D and fixed upon the stem by means of a set-screw *d'*. The threaded portion of the screw-stem is equal in length to the vertical play of the valve.

It is quite difficult to cause the slide C to seat perfectly upon the valve-seat *a'* and at the same time to so arrange the screw-stem E that it will operate the slide without cramping or binding. I overcome these objections by journaling the upper end of the screw-stem in a sliding journal, which is adjustably secured to the upper support. This support is provided with a tongue D' and slot *d''*, through which the screw-stem passes and is free to be moved backward or forward with relation to the plane of the valve-seat. This adjustable journal comprises a slide G, which is provided with downwardly-projecting hook-shaped fingers G', which are arranged to grasp the tongue D', which is provided upon the upper support. This slide G is also provided with a slot *g*, through which passes a bolt H, which also passes through a suitable opening in the upper support, and a nut *h* is arranged to screw upon the bolt to lock the slide in its adjusted position. By this construction the screw-stem is arranged to be adjusted toward and from the plane of the valve-seat, and thus cause the slide to seat perfectly upon the valve-seat, thereby to avoid all straining of the various parts. This is specially designed for use where the water is under considerable pressure. With ordinary water-gates, where there is but little pressure, the gate will work very well, even though the journal is not adjusted.

It is desirable that the valve-slide be of very simple construction, and that it be very strong and not liable to become broken. It is also essential that the wedging-grooves and the lugs or their equivalents which are provided along the side of the slide be of such a character that sand or gravel will not interfere with the successful operation of the slide. For this reason I cut the grooves or guide-ways *b''* laterally entirely through the projections B B' *b b'* in which they are formed, so as to allow the water to flow through the grooves and to thereby dislodge all loose sediment or sand therefrom. The projections *c c'*, &c., are wedge-shaped, and in case any sediment or sand should settle in these grooves the action of the wedge-shaped projections as they are forced into their seats will dislodge the material from the grooves and the water flowing therethrough will carry it away.

The slide C is provided with a raised annular ring C', corresponding to the valve-seat *a'*, provided upon the plate *a*, and these two faces are ground to fit smoothly together. To the upper portion of this slide C is rigidly secured a nut or tap J, which is provided with a screw-threaded opening *j*, through which the screw-stem E screws, and when the stem is rotated this nut J travels along the stem to raise and lower the slide.

In order to arrange the projections *c c'*, &c., which force the slide against its seat practically even with the top and the bottom of the valve-seat, so that the pressure of the valve-slide against the valve-seat will be uniform, it is necessary that these projections offset, or, in other words, that each of the lower projections *c' c'''* be arranged inside of a vertical line drawn from the inner line of the upper projections—that is to say, the lugs *b b'*, in which the lower sections of the slide-grooves are arranged are inside of a vertical line drawn from the inner line of the upper lugs B B', in order that when the slide is raised the projections *c' c'''*, which enter the lower groove-sections, may pass such lugs; but when the slide is forced downward into its closed position the lower projections will enter the lower sections of the guideways or grooves and will wedge therein, thus forcing the valve-slide firmly against its seat, so as to prevent any escape whatever of water through the gate when closed.

The lugs and the guideways are so arranged with relation to each other that the pressure exerted against the slide by the upper and lower lugs will be uniform and simultaneous. As shown in the drawings, the valve is offset to form the projections which enter the slide-grooves.

I do not limit my invention to any especial mode of construction; but I consider the construction shown to be preferable, for the reason

that thereby great strength is given to the slide.

In southern California water disputes are very frequent and stealing water by tampering with the gates is very common. The water is ordinarily distributed by a zanjero, who regulates the gates to deliver to each person his proper amount of water; but it has heretofore been impossible to lock the gates in their various positions required to allow any desired flow of water, except by inclosing the gates in a protecting case or box. In pipe-lines as ordinarily constructed it has been deemed impracticable to provide a protecting case for each gate, and, furthermore, if practicable, it would be so expensive as to preclude its general adoption. By my improved gate, in which the screw-stem remains stationary while the valve-slide travels up and down along the screw-stem, I overcome this difficulty and provide means whereby the gate may be locked with the slide in any position desired, either fully closed, fully open, or partially open to any extent. This means consists of the screw-stem E, provided with the angular shank *e*, the locking-staple K, attached to the frame of the gate, and the locking-link L, having one end, *l*, adapted to fit upon the angular end *e* of the screw-stem and its other end, *l'*, adapted to fit upon the staple K. This link is secured by the staple by means of a padlock M. By these means it is made impossible to remove the link from the angular end of the screw-stem until the padlock is removed to allow the link to be removed from the staple, and since the screw-stem is always stationary as regards axial movement the slide can be adjusted at any desired position and the stem easily and effectually locked against further rotation, thus locking the valve-slide in its adjusted position.

In order to adapt my invention for use in pipe-lines under heavy pressure, I provide a stuffing-box N, Fig. 3, arranged encircling the upper end of the screw-stem E, allowing the angular shank *e* of the stem to project above such stuffing-box, so that the top of the gate may be capped over, as shown in Fig. 3, leaving the end *e* projecting through the capping to allow the gate to be regulated. The neck *n* of this stuffing-box N is cast integral with the adjustable journal-piece G, in which the screw-stem is journaled, and the opening *n'* is drilled somewhat larger than the screw-stem E, so that when the stuffing-box is in position upon the screw-stem the screw-stem may be moved back and forth to bring the slide into alignment with its seat without causing it to bind in the stuffing-box.

A suitable strengthening-rib *a''* is provided upon the rear face of the gate-frame to prevent any buckling or straining of the frame.

As shown in the drawings, the upper part of the gate is secured to the lower portion thereof by means of wrought-iron straps A''; but it is to be understood that my invention is not limited to any special details of construction and that the entire frame of the gate may be made of cast-iron, if deemed desirable.

The gate is secured to the stand-pipe by bolts O, in addition to the usual cement mortar.

In practice to open the gate the crank is placed upon the angular portion *e* of the screw-stem E, and the stem is rotated to cause the nut or tap to travel upward along the screw-stem, thus raising the slide and opening the valve.

To close the gate the operation just described is reversed, and the slide is thereby carried downward until the projections upon the valve-slide enter the inclined grooves and sliding downward therealong force the slide firmly against the slide-seat and absolutely prevent any leakage of water through the gate.

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

1. A head gate having a slide valve operated by a screw stem, and having such screw stem arranged to be adjusted toward and from the plane of the valve seat.

2. A head gate having a valve slide operating screw stem journaled at one end in a fixed bearing, and journaled at its other end in a bearing capable of adjustment toward and from the plane of the valve seat.

3. In a head gate, the combination of the valve seat; the valve slide operating screw stem journaled at its lower end in a fixed bearing, the valve slide arranged to seat upon the valve seat and provided with the nut arranged to travel along the screw stem; the upper support; and the journal adjustably secured to the upper support and arranged to journal the upper end of the screw stem.

4. A slide valve having its frame provided with the valve seat and two upper and two lower downwardly inclined valve slide grooves arranged upon opposite sides of such valve seat, the two lower grooves being offset to bring them inside of the upper guideways; the valve slide provided with the projection arranged to enter the grooves, and suitable means for operating the slide.

5. In a head gate the combination of the frame provided with the valve seat and with the lugs having the downwardly inclined slide valve grooves arranged therein, two upon each side of the valve seat one above the other, the lower guideway upon each side being inside of a vertical line drawn from the inner face of its respective upper guideway; the slide valve provided with the projections arranged to seat in the slide valve grooves when the valve is closed, and suitable means for operating the slide valve.

6. A slide valve having its valve slide grooves each formed in two independent sections inclined at an angle with the plane of the valve seat, and the valve slide having four

projections arranged to enter the four detached valve slide grooves and to wedge the valve slide tightly against its seat.

7. A slide valve having its valve slide grooves each formed in detached sections inclined at an angle with the plane of the valve seat and the slide valve having projections one arranged to enter each section of the valve slide grooves and to wedge the valve slide tightly against its seat.

8. A slide valve comprising a plate having a discharge opening and a valve seat surrounding such opening; a series of lugs projecting from the face of the plate and having the valve slide grooves formed therein in detached sections, each section being inclined at an angle with the plane of the valve seat; the valve slide arranged to enter the detached sections of the valve grooves to wedge the valve tightly against the valve seat, and suitable means for operating the valve slide.

9. A slide valve comprising a plate having a discharge opening and a valve seat surrounding such opening, and having four lugs projecting from the face of the plate, each lug having formed therein a valve slide groove, such groove extending transversely through the lug to allow the free passage of water therethrough; the valve slide arranged to enter such grooves, and to wedge tightly against the valve seat, and means for operating the slide.

10. A slide valve comprising a plate having a discharge opening and a valve seat surrounding such discharge opening; a series of lugs projecting from the face of the plate and having the valve slide grooves formed therein in detached sections each section being inclined at an angle with the plane of the valve seat; the valve slide arranged to enter the detached sections of the valve slide grooves and to be wedged tightly thereby against the valve seat; the arm secured to the plate and extending from side to side of the valve seat above the top thereof and arranged to form in combination with such plate a slot through which the valve slide reciprocates; the screw stem having one end journaled in the arm and its other end journaled to the upper portion of the head gate; and the nut, secured to the valve slide and adapted to travel along the screw stem to raise and lower the slide.

11. In a valve, the combination of the valve seat; the valve slide operating screw stem journaled to revolve and provided with an angular end; the valve slide arranged to seat in the valve seat and provided with a nut screwed upon said screw stem; a locking staple fixed to the frame of the valve; and a link arranged to fit upon the angular head of the screw stem and also upon the locking staple.

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