

(No Model.)

2 Sheets—Sheet 1.

W. L. MARSHALL.

AUTOMATIC MOVABLE DAM OR SLUICeway GATE.

No. 579,349.

Patented Mar. 23, 1897.

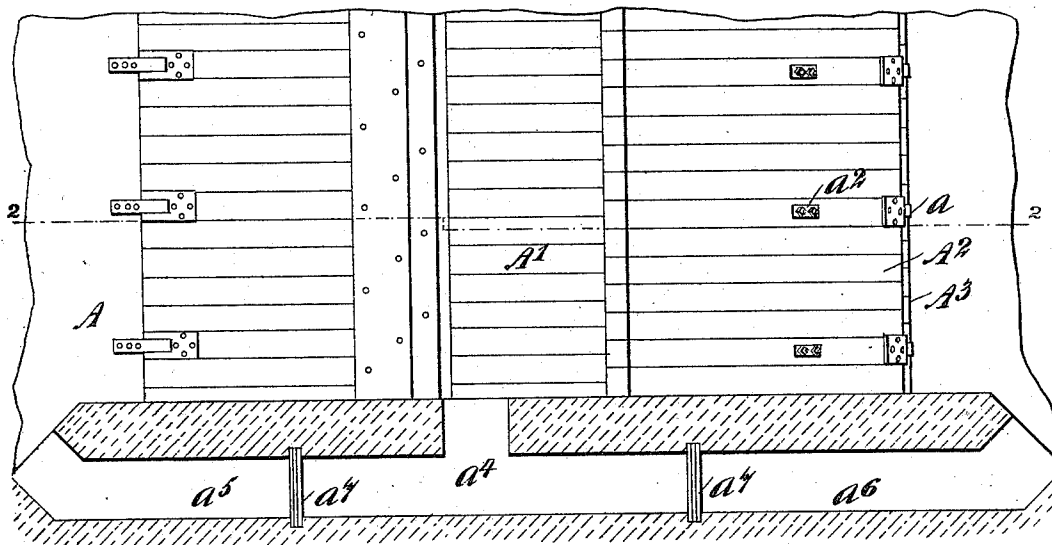


Fig. 1

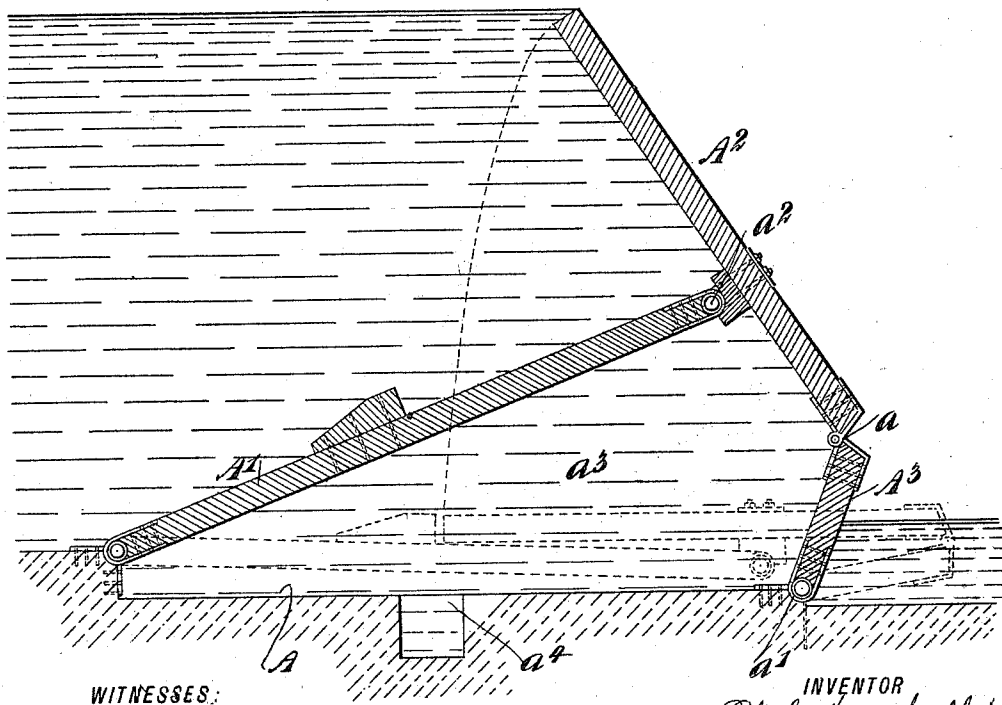


Fig. 2

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ATTORNEYS

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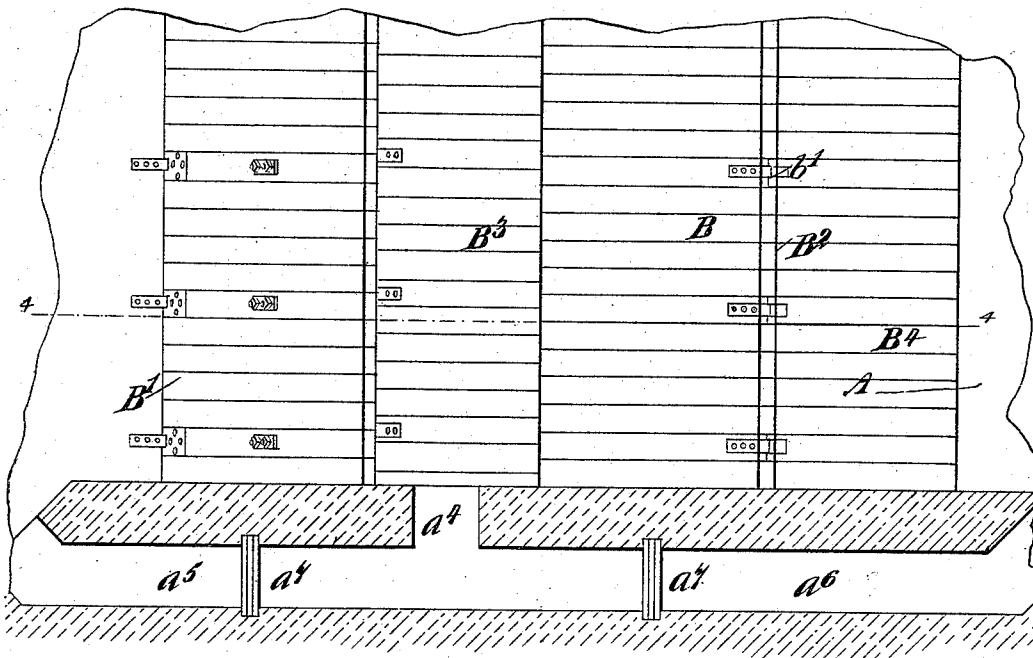
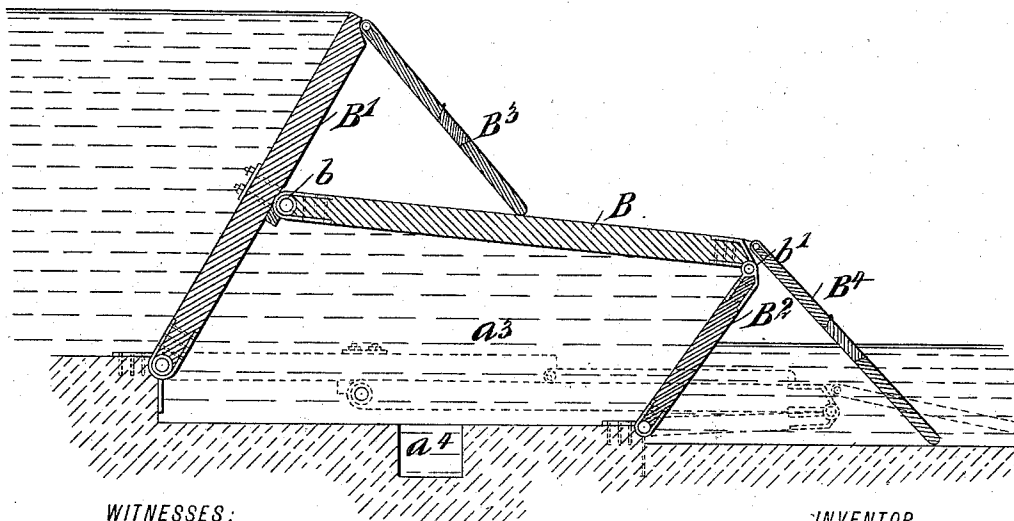


Fig. 3



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Fig. 4

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UNITED STATES PATENT OFFICE.

WILLIAM L. MARSHALL, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF
AND HENRY JERVEY, OF SAME PLACE.

AUTOMATIC MOVABLE DAM OR SLUICeway-GATE.

SPECIFICATION forming part of Letters Patent No. 579,349, dated March 23, 1897.

Application filed December 12, 1895. Serial No. 571,899. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. MARSHALL, of Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Automatic Movable Dams or Sluiceway-Gates, of which the following is a full, clear, and exact description.

This invention relates to improvements in dams or sluiceway-gates of the type known as the "bear-trap," in which type the gate is raised by admission of water under pressure into the hydraulic chamber under leaves and lowered by the abstraction of the same by the pressing of the water in the upper part on the upper leaf; and the objects of my invention are to provide a construction whereby sliding friction is avoided; in which all trouble from drift is obviated; in which the greatest possible height of dam in proportion to width of leaves may be attained, and a dam that will easily close flat and be started from rest with the least head of water; in which also the hydraulic chamber is of least cubic contents, to minimize volume of the water required in working the gate.

The invention consists in extending the leaf that is effective in forming the dam one-half or slightly more than one-half of its width above and beyond the line of attachment of the two leaves, to increase the height or lift of the dam relative to the width of base, and at the same time to reduce the volume of the hydraulic chamber. The two leaves are connected together at or just above the center of pressure upon the extended leaf.

The invention further consists in the construction and novel arrangement of parts, as will hereinafter appear, and be particularly pointed out in the appended claims.

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

Figure 1 is a plan view of a movable dam or sluiceway-gate embodying my invention. Fig. 2 is a vertical section thereof on the line 2 2 of Fig. 1. Fig. 3 is a plan view showing a modification, and Fig. 4 is a section on the line 4 4 of Fig. 3. Figs. 3 and 4 represent the preferable or most useful application of the invention. Figs. 1 and 2 represent a

type of my invention which is less useful in comparison with the type shown in Figs. 3 and 4, except in clear water free from drift.

Referring first to the example of my improvement shown in Figs. 1 and 2, A designates the bed of a sluiceway, in which the gate is located. The gate comprises an upstream-leaf A' and a downstream-leaf consisting of two sections A² A³, hinged together horizontally, as at a. The lower edge of the lower section A³ is hinged to the bed, as at a', and the width of this lower section A³ is substantially one-third the width of the upper section A².

The upstream-leaf A' is hinged at its upstream end to an elevation of the bed A, so that a space is left between the bed and leaf A' when said leaf is in its lowermost position, thus providing a space in which dirt and small articles may accumulate and not interfere with the operation or entire depression of the gate. The leaf A' is substantially equal in width to the combined widths of the sections A² A³, and the downstream edge of the upstream-leaf is hinged to the leaf-section A² at a point two-thirds the distance from its top, as at a².

The leaves above described with the sluiced-bed form the walls of a hydraulic chamber a³, which has a port communication a⁴, with an inlet a⁵ and with an outlet a⁶, the said inlet and outlet each being provided with a valve a⁷, which may be operated in any well-known manner.

By the arrangement of parts as above described the center of the pressure of the water against the components of the downstream-leaf will always fall nearer to but somewhat below the point where the upstream and downstream leaves are hinged together, so that the lower leaf can never straighten out, but will always be drawn down whenever the water is withdrawn from beneath the leaves, without regard to the depth of water over the crest or the extent of the backwater.

Referring now to the example of my improvement shown in Figs. 3 and 4, it will be seen that the upper section B of the downstream-leaf has a hinge connection b with the upstream-leaf B' intermediate of the top and bottom edges of said upstream-leaf, and that

the hinge connection b' between the sections $B B^2$ of the downstream-leaf is salient or projected downstream, as in the example first described, and on account of this downstream salient joint, which can never be made by water-pressure to fully open so that the sections of the downstream-leaf come into the same straight line, shocks or sudden blows communicate no shocks to the main hinges or fastenings of the gate, but there will always be a yielding due to oscillatory movement about this salient hinge upon impact.

In streams where heavy drifts occur an apron B^3 may be hinged to the upper edge of the leaf B' with its fore edge resting on the section B of the downstream-leaf. Also an apron B^4 may be attached to the section B of the downstream-leaf to protect the angle under the lower section of the downstream-leaf against accumulation of drift or gravel. A similar inclined apron moving in the opposite direction may be placed in front of the type shown in Figs. 1 and 2.

The principle upon which my invention operates and a concise method of construction may be stated as follows: The lower leaf is in two unequal sections, with the lower section materially narrower than the upper section of the leaf, and the angle formed by the two sections of the lower leaf must always protrude downstream or from the hydraulic chamber a^3 . In all other jointed leaves this angle is reëntrant, or folds into the hydraulic chamber. The hydraulic chamber must always be a quadrangular prism with salient angles, with sides equal or nearly so, two and two.

In the example of my improvement shown in Fig. 2 the equal sides are connected together or are adjacent. In the example shown in Fig. 4 the equal sides are opposite, each side opposite its equal side, the chamber thus forming a parallelepipedon.

Referring particularly to Fig. 2, the width of the leaf A' or the distance between its hinged connections is equal to the distance between the upper edge of the leaf-section A^2 and the lower hinge connection of the section A^3 . The distance between the upper edge of the leaf-section A^2 and the hinge connection with the leaf A' equals the distance between said hinge connection, the hinge connection A , and the hinge connection A' .

Referring to Fig. 3, the distance between the lower hinge connection of the leaf B' and the hinge b equals the distance between said hinge b and the upper edge of the leaf, and the distance between said hinge b and the upper edge of the leaf equals the distance between the hinge b' and the lower hinge connection of the leaf-section B^2 , and the distance between the hinge-sections $b b'$ equals the distance between the lower hinge connections of the leaf B' and the leaf-section B^2 . The section B must always be greater in width than two-thirds the width of the upper leaf whenever the two leaves are joined together

at the middle line of the upstream-leaf. When the leaves are joined, not at but above or below the middle line, the section B must be wider than when attached along the middle line for the same angle of rise. Consequently the middle line is the most economical line of junction. The principle upon which this form is based is this. If any oblique-angled quadrangular prism having the sides equal two and two, the pairs unequal, be subjected to an external pressure directed inward, it will collapse or fall flat. If the pressure be from within directed outward, the sides will move until the volume of the quadrangular prism is a maximum, which will occur when the narrower sides are perpendicular to the wider sides. If the quadrangular prism be a parallelepipedon, it will become a rectangular parallelepipedon. The direction of the motion will be determined by the longer or wider sides which expose the greater areas to pressure. If now this quadrangular prism be subjected to an internal pressure and at the same time to an external pressure on one or more of its sides less in amount than the internal pressure, it will assume an oblique-angled position intermediate between its collapsed position and that corresponding to its maximum volume.

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

1. A movable dam or sluiceway-gate, comprising a hinged upstream-leaf, and a downstream-leaf consisting of two hinged sections, the upper section of which has a hinge connection with the upstream-leaf, and the hinge connection between the two sections of the downstream-leaf being projected beyond a vertical line of the hinge connection of the lower section with the bed of the sluiceway, substantially as specified.

2. A movable dam or gate, comprising an upstream-leaf and a downstream-leaf in two hinged sections of unequal width, the upper section being the wider, one of said leaves having a hinged connection with the other leaf along a line parallel to its top edge and about one-half its width below said edge, substantially as specified.

3. A movable dam or gate, comprising a downstream-leaf consisting of two hinged sections, and an upstream-leaf hinged to and below the top edge of the downstream-leaf, and having a width substantially equal to the width of the combined sections of the downstream-leaf, substantially as described.

4. A movable dam or gate, comprising an upstream and a downstream leaf in two hinged sections, the said upstream and downstream leaves being hinged together in such a manner that one leaf shall project above and beyond the line of junction of the two leaves, substantially as specified.

5. In a bear-trap or rising-and-falling dam, a hydraulic chamber in the form of a quadrangular prism with all angles always salient

ent or projecting outward from the hydraulic chamber, the sides of the prism being practically equal, two and two, but the sets of two being unequal in width, set to set, substantially as specified.

5 6. A bear-trap or sluice gate, with a quadrangular prism-shaped hydraulic chamber having only salient angles, with its sides equal taken two and two, but with the components
10 of one set of two sides greater in width than the components of the other set, equal sides of the hydraulic chamber being hinged together two and two, with the wider set of sides upstream, substantially as specified.

15 7. In a rising-and-falling hydraulic or bear-trap dam, a hydraulic chamber in the form of an oblique-angled, parallelepipedon with its wider sides substantially coincident with and parallel with the base of the dam, substantially
20 as set forth.

8. In a rising-and-falling hydraulic or bear-trap dam, a hydraulic chamber in the form of an oblique-angled, parallelepipedon with its

wider side substantially coincident with and parallel with the base of the dam, and with
25 the hydraulic chamber on the downstream side of the effective leaf forming the dam, substantially as specified.

9. A dam comprising an upstream-leaf, a downstream-leaf hinged thereto below its top
30 and consisting of two hinged sections, and an apron hinged to the top of the upstream-leaf and extended upon the upper section of the downstream-leaf substantially as specified.

10. A dam, comprising an upstream-leaf, a
35 downstream-leaf hinged thereto and consisting of two sections, an apron hinged to the upper end of the upstream-leaf and extended over the downstream-leaf, and an apron
40 hinged to the downstream-leaf at the junction of the two sections, in combination, substantially as specified.

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Witnesses:

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