(No Model.)

3 Sheets—Sheet 1.

J. B. TAINTER.

SLUICEWAY GATE.

No. 344,878. Patented July 6, 1886.

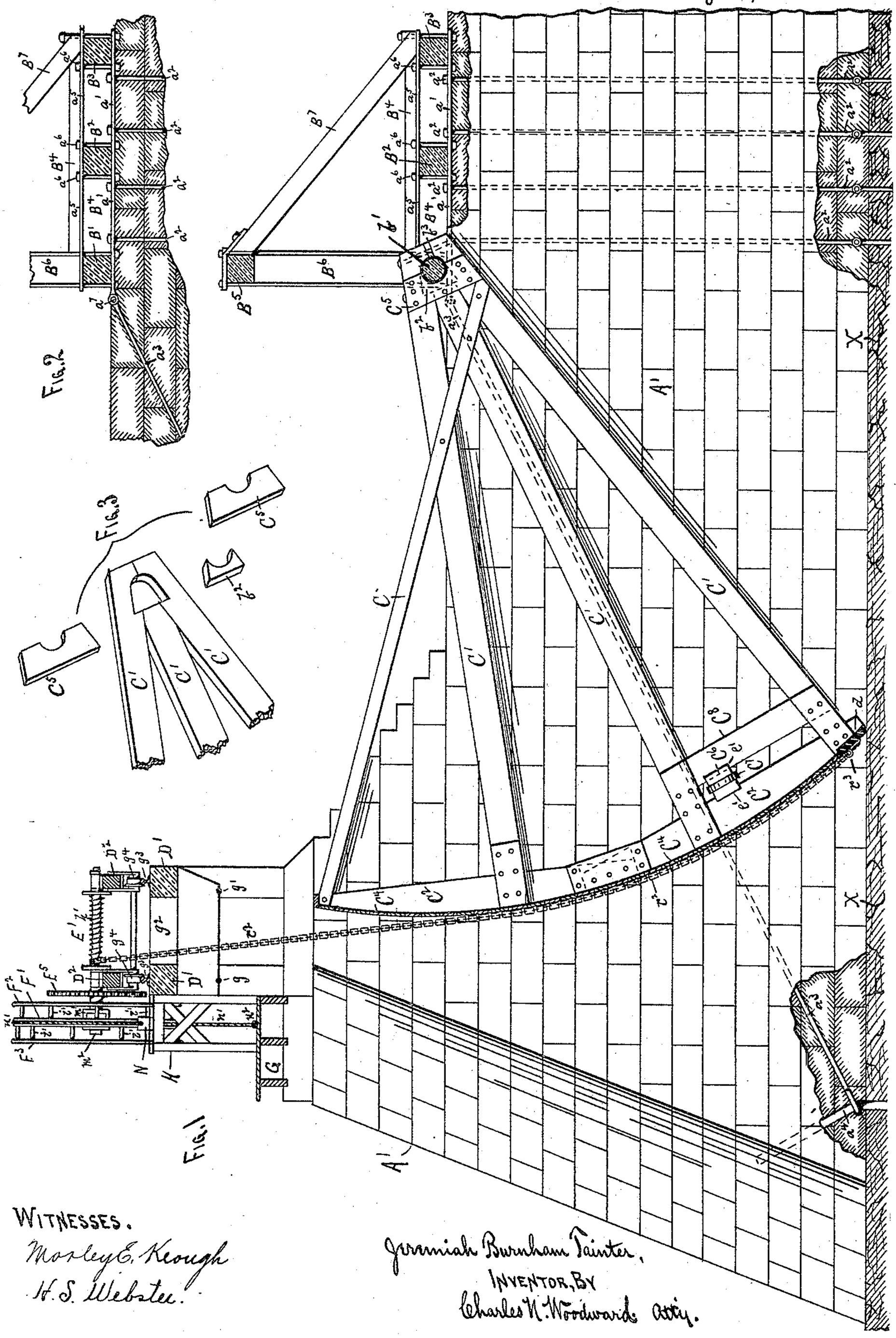

FIG. 2.

FIG. 3.

FIG. 1.

WITNESSES.

Morley E. Keough

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INVENTOR, BY

Charles N. Woodward Atty.

(No Model.) 3 Sheets—Sheet 2.

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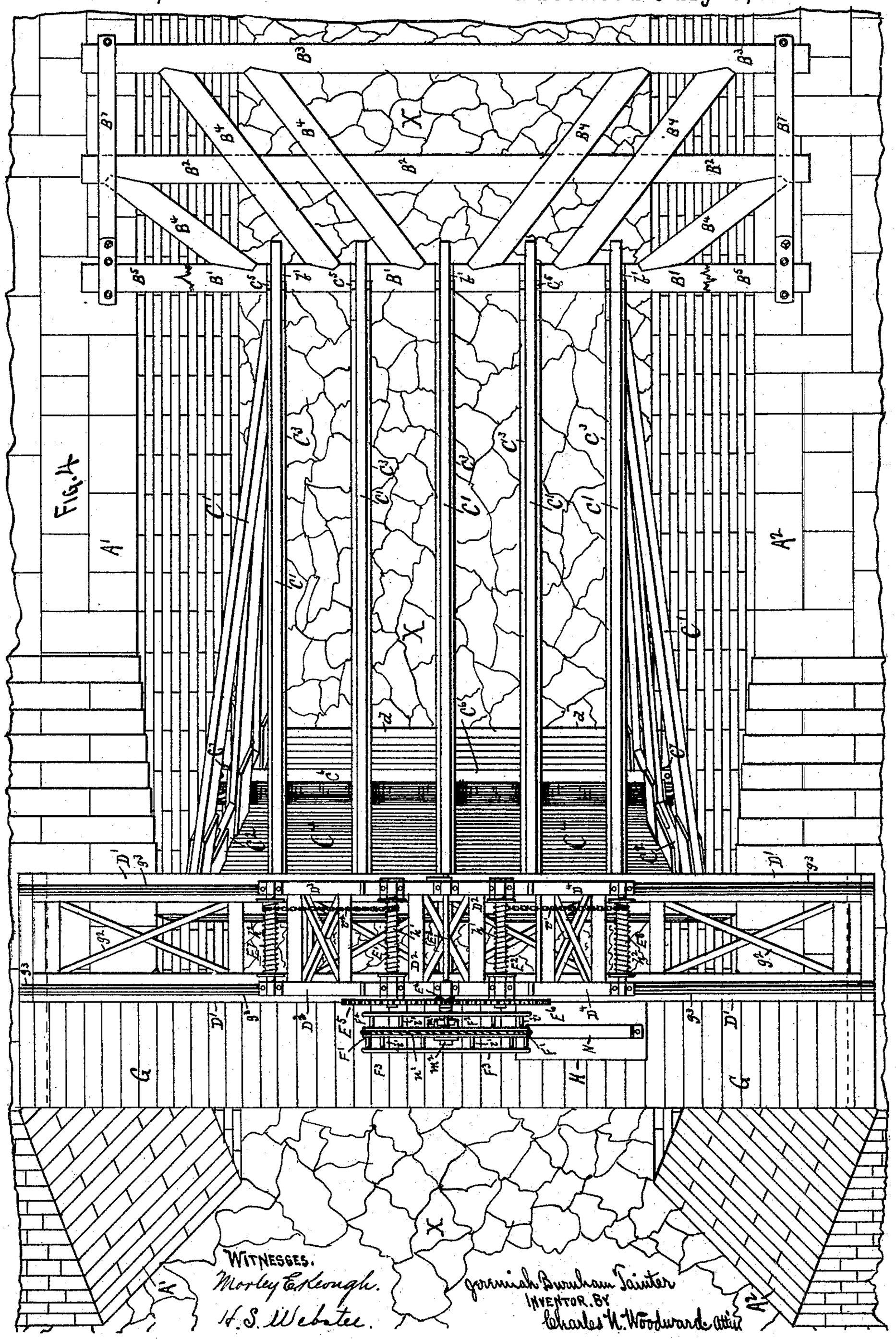

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J. B. TAINTER.

SLUICEWAY GATE.

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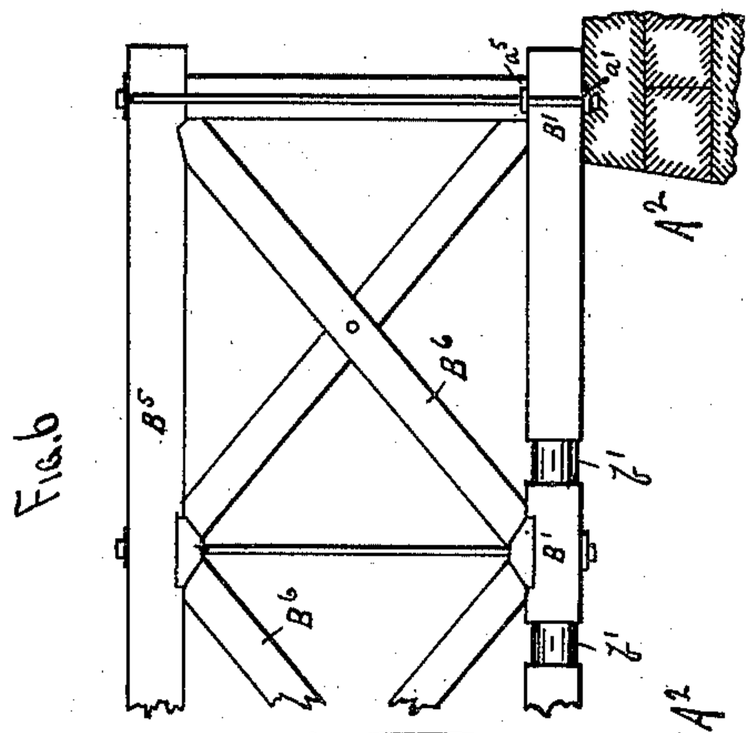

Fig. 6.

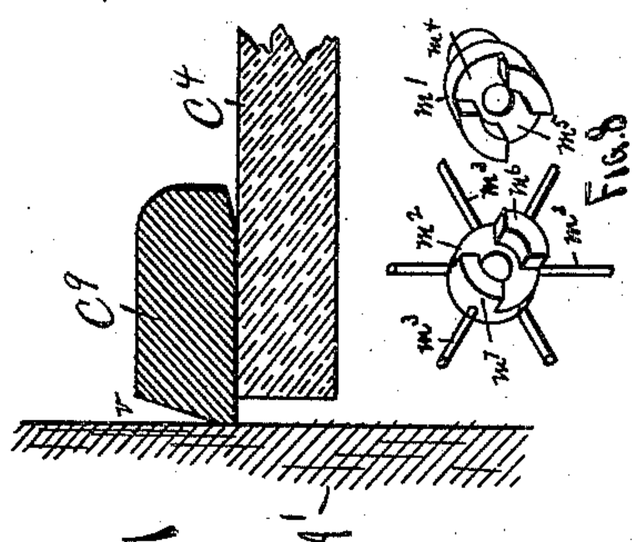

Fig. 7.

Fig. 8.

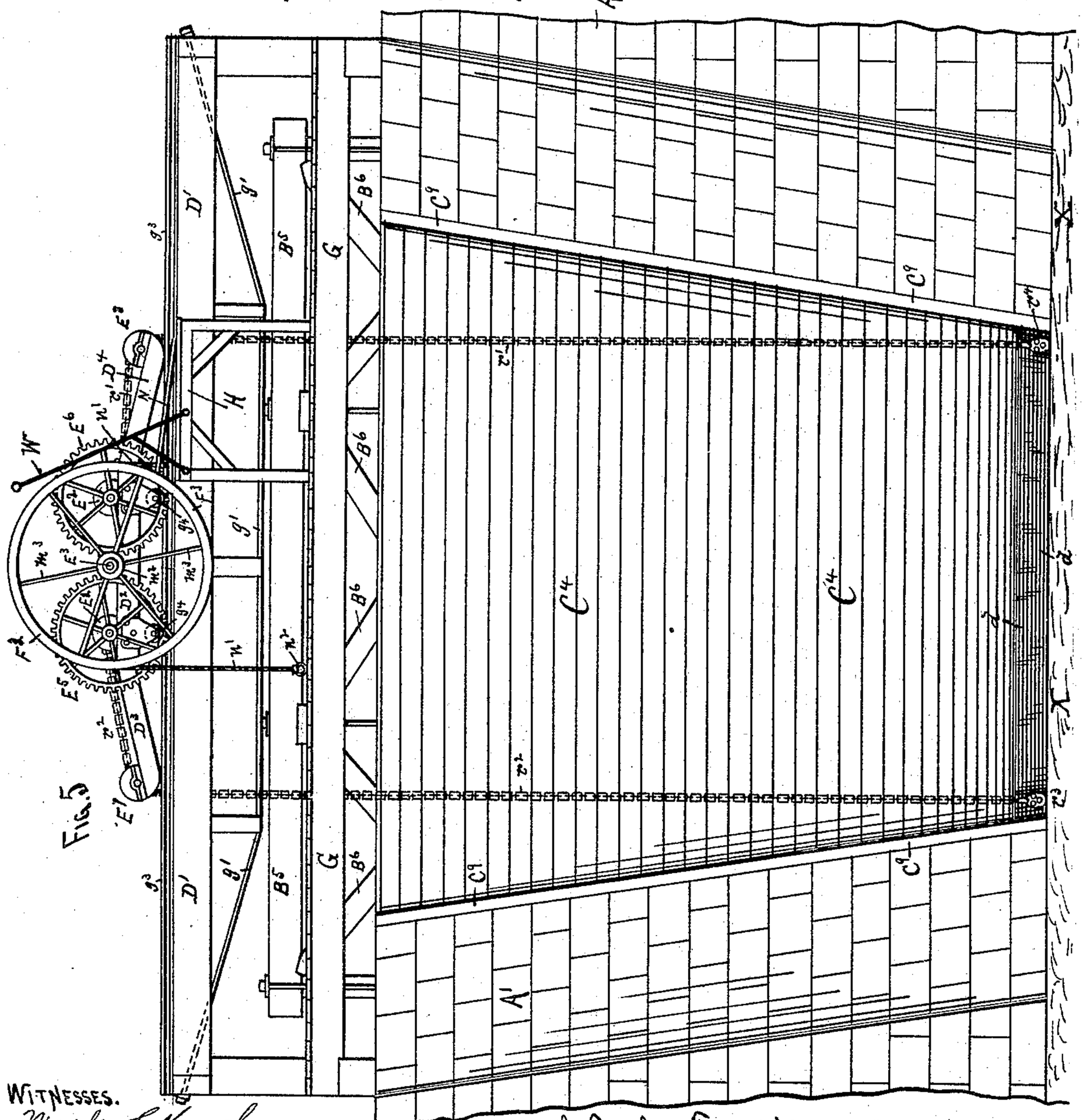

Fig. 5.

WITNESSES.
Morley E. Keough.
H. S. Webster.

Jeremiah Burnham Tainter, INVENTOR. By
Charles N. Woodward Atty.

UNITED STATES PATENT OFFICE.

JEREMIAH BURNHAM TAINTER, OF MENOMONEE, WISCONSIN.

SLUICEWAY-GATE.

SPECIFICATION forming part of Letters Patent No. 344,878, dated July 6, 1886.

Application filed November 16, 1885. Serial No. 183,012. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH BURNHAM TAINTER, a citizen of the United States, a resident of Menomonee, in the county of Dunn and State of Wisconsin, have invented certain new and useful Improvements in Sluiceway-Gates, of which the following is a specification.

Figure 1 is a sectional side elevation. Fig. 2 is a detached sectional detail of a portion of one of the pieces and the truss-frame, illustrating the manner of securing the anchor-bolts, &c. Fig. 3 represents detached perspective views of the parts of one of the gate-arms. Fig. 4 is a plan view, and Fig. 5 is a front elevation, of the gate in position between the piers. Fig. 6 is a detail of a portion of the truss-frame. Fig. 7 is an enlarged sectional detail of a portion of the gate-facing, illustrating the construction of the "packing" of the gate. Fig. 8 represents enlarged views in perspective of the clutch-connection of the hoisting-wheel.

A' A² represent the two piers between which the gate is adapted to operate, and which may be constructed in any desired manner, although for the purpose of illustration I have shown them constructed of stone. Across the lower ends of the piers is secured a truss-frame consisting of main base-timbers, B' B² B³, said base-timber B' being suitably braced by diagonal braces B⁴ from the timbers B² B³, so as to firmly support the timber B'. The timber B' is the lower "chord" of a truss, B⁵ being the upper chord, and B⁶ the diagonal braces connecting them, the four main timbers B' B² B³ B⁵ and the braces B⁴ B⁶ forming a double "truss" or frame of great strength, and adapted to resist the very heavy pressure which the water will cause the gate to exert upon it. Embedded into the tops of the piers, beneath the ends of the timbers B' B² B³, are iron straps *a'*, (see Figs. 1, 2, and 6,) the straps being secured at their downstream or rear ends and at suitable intermediate points by rods a^2, passing down through the piers and into the sub-foundation or the ledge of rock X, forming the bed of the stream. The ends of the straps *a'* toward the upstream end of the piers are connected by diagonal tie-rods a^3 to anchor rods or bolts a^4, secured in the sub-foundation or rock bottom X, as shown, the rods a^2 and a^3 and the anchor-bolts a^4 thus forming, in connection with the straps *a'*, a very secure means of fastening the piers to the sub-foundation. In this connection the diagonal or bracing form of the rods a^3 performs an important function, as their resistance against the force of the water is thereby greatly increased. The timbers B' B² B³ are secured to these straps *a'* by straps a^5 and tie-bolts a^6, so that the truss-frame as well as the piers is supported by the same means. Braces B⁷ will connect the timbers B³ and B⁵, to give additional strength to the truss. The tie-rods a^3 will be secured to the straps *a'* by bolts a^7, so that they can be readily disconnected. By merely releasing the bolts which connect the straps *a'* to the tie-rods a^2 a^3 the whole truss-frame may be removed from the piers, which is frequently a great convenience.

The gate is formed of sets of arms C', curved ribs C², braces C³, and curved sheathing or facing C⁴, the construction of the gate being similar to that shown in the patent granted to me May 10, 1881, No. 241,444. Any number of the sets of arms, ribs, and braces may be used, according to the size of the gate. In the drawings seven sets of arms, braces, and ribs are shown, this being the number usually required on a twenty-foot gate; but the number may be increased or decreased, as required. The rear ends of the arms C' converge, and are inclined on their adjacent edges and adapted to encompass circular bearings *b'*, formed on the timber B', the latter thus forming a center on which the gate swings in opening and closing. The arms, braces, ribs, and facing are all made of pine or other suitable light material, except the lower plank, *d*, of the facing, which is formed of oak or other hard wood faced with iron on the lower corner, to resist the extra strains to which that part of the gate is subjected by logs, &c., passing beneath it. Bearing-blocks b^2, of oak or other hard material, will be inserted into the arms C' in front of the bearings *b'*, to receive the pressure and resist the wear of the gate. The arms C' are re-enforced by side plates, C⁵, the side plates being also cut out to partially encompass the bearings *b'*. The plates C⁵ thus perform three distinct functions—viz., securing the arms C' together, holding the bearing-blocks b^2 in place and preventing them from

working out endwise, and increasing the width of the bearing-surface of each set of the arms C′ upon the timber B′. The latter function of the plates C^5 is of great importance, as it spreads the strains over a larger surface of the timber B′, and lessens the liability of its being worn out. Ferrules b^3, of sheet metal, will be placed upon the bearings b', to receive the wear and prevent its coming upon the timber B′ itself. The inner walls of the piers are shown tapering upward and outward, and the gate-facing C^4 is shown correspondingly tapering, the outer sets of arms, braces, and ribs being also set correspondingly angular, to support the gate equally at all points. The outer or angular sets of arms are shown connected at their converging ends to the next or adjacent set of arms, so that no necessity exists for providing the angular arms with bearings upon the timber B′, although they may be journaled on the timber, if preferred. The piers and gate being both tapering, of course the moment the gate begins to rise the gate moves away from the piers on both sides, leaving openings for the passage of the water on each side, as well as beneath the gate. The gate, if thus left without side support while being raised and lowered, would be very liable to become strained and wrenched by the unequal action of the rapidly-flowing water; but to prevent this I arrange across the gate, in the rear of the ribs C^2, a timber, C^6, provided with anti-friction wheels C^7, adapted to rest against the sides of the piers. This timber C^6 is provided with gains or notches e', which the inner edges of the ribs C^2 and one edge of guide-strips C^8 fit, to keep the timber from moving endwise, while at the same time permitting the gate to be raised and lowered to a certain extent without affecting the timber. The timber C^6 will be long enough so that its wheels C^7 will rest in contact with the tapered sides of the piers at some distance up from the bottom of the sluiceway, and when the timber is thus placed it will be at the top of its line of travel in its notches e' between the ribs C^2 and guides C^8, so that the gate can be raised until its lower edge, d, is nearly or quite out of the water before the lower arm, C′, reaches the timber C^6 and lifts it upward with the gate. By this means the timber C^6 firmly holds the gate centrally between the tapered piers, while at the same time not interfering with its proper operation.

Across the upstream ends of the piers, as close to the gate as possible without interfering with its raising, is a frame, D′, supported and strengthened by truss-rods g' and cross-braces g^2, and having on its upper surface rails g^3, on which the frame D^2 of a hoisting apparatus is adapted to run by flanged bearing-wheels g^4. A bridge, G, is also shown resting across the piers to enable the operators to pass from one pier to the other. This hoisting apparatus consists of two drums, E′ E^2, having spiral grooves h', and suitably mounted by shafts and bearings on the frame D^2, and both drums adapted to be driven by one common central shaft, E^3, having a pinion, E^4, acting on gears E^5 E^6 on the shafts of the drums E′ E^2. On the outer end of the shaft E^3 is mounted, by a clutch-connection, a large wheel formed, as shown, of a main central rim, F′, and side rims, F^2 F^3, the side rims being connected to the central rim by rounds i', the latter forming handles or foot-rests by which the wheel may be revolved. The rounds i' may be arranged alternately, as shown, or opposite each other, as preferred. A small platform, H, is shown on the bridge G on one side of the wheel F′ F^2 F^3, of a suitable height to enable a man standing thereon to conveniently step upon the rounds i', and thus utilize his whole weight to revolve the wheel, and by stepping from round to round the wheel can be kept in constant motion.

The construction of the clutch-connection before mentioned, whereby the wheel F′ F^2 F^3 is connected to the shaft E^3, is more clearly shown in the detached detail views in Fig. 8, and consists of two disks, m' m^2, one fast to the shaft E^3, and the other forming the hub of the rim F′, to which it is connected by spokes m^3. The disk m' is formed with two cavities, m^4 m^5, and the disk m^2 is formed with two projections, m^6 m^7, which fit into said cavities when the disk m' is placed on the shaft E^3 with the faces of the disks brought into contact, forming a "clutch-like" joint that, when the disk m^2 is secured to the shaft E^3 by a nut or key outside the disk, firmly fastens the wheel to the shaft, while at the same time rendering the wheel very readily removable, if required.

In the outer periphery of the rim F′ a groove is formed, in which a rope, n', fits, one end of the rope being connected at n^2 to the bridge G, and the other end being secured to the free end of a foot-treadle, N, the latter hinged at its other end to the platform H. Thus by pressing down upon the treadle N the rope n' is compressed around the rim F′, to form a "brake" to the wheel to hold the drums E′ E^2 stationary wherever desired.

Projecting from each end of the frame D^2 are smaller frames D^3 D^4, carrying spirally-grooved drums E^7 E^8, similar to the spirally-grooved drums E′ E^2, the outer ends of the frames D^3 D^4 resting upon the rails g^3 g^3. The grooves run around the drums E′ E^2 E^7 in the same direction, while the grooves run around the drum E^8 in the opposite direction, as shown in Fig. 4. A chain, r', leads from the under side of the drum E^2, and a similar chain, r^2, leads from the upper side of the drum E′, so that as the drums are revolved by the gears E^4 E^5 E^6 the chains r' r^2 will be wound around both drums E′ E^2.

In Fig. 4 the chains r' r^2 are shown in the position they would assume when the gate is elevated, the coils, however, on the drums E′ E^2 being omitted, to enable the spiral grooves thereon to be clearly shown. The chains r' r^2 pass from the drums E′ E^2 in opposite directions over the drums E^7 E^8, and thence down

to the lower edge, *d*, of the gate, to which they are connected, as shown at r^3 r^4.

By forming the drums E′ E² with the spiral grooves *h*′, the chains *r*′ *r*² are wound upon them in a single row and without cramping the chains or permitting one section to "ride" or overlap the other; but in order to more certainly insure this result I also provide the drums E⁷ E⁸ with grooves *h*², similar to those in the drums E′ E², and being revolved by the chains in passing over them the chains will be carried along the drums E⁷ E⁸ at the same time that they pass over them, and thus keep the chains at right angles to the drums E′ E² and effectually prevent one section of the chain from "riding" the other section. The downstream ends of the drums E′ E² E⁷ E⁸ are directly above where the points r^3 r^4 will come when the gate is raised, and the length and diameter of the drums will correspond with the size of the gate, so that the drums E′ E² will hold just enough chain to raise the gate. In a twenty-foot gate, for instance, a drum six inches in diameter would require fourteen complete turns of the spiral groove to hold twenty feet of chain, which for a two-inch chain (which is the size that would be required for such a sized gate) would require a drum thirty inches long. With such a sized drum the chains would, when first starting the hoisting mechanism, stand off at a slight angle, as shown in Fig. 1; but the distance between the drums E⁷ E⁸ and the points r^3 r^4 is so great that this slight inclination would not be sufficient to throw the chains out of the grooves *h*² in the drums, and even this slight inclination is constantly decreasing, so that by the time the points r^3 r^4 are on a line even with the center of the bearings *b*′, and begin to move downstream with the rising of the gate, the chains will have been carried along the drums E⁷ E⁸ by the spiral grooves *h*² until the chains are perpendicular, and from that time on, until the gate is raised to its highest point, the chains will be carried along the drums E⁷ E⁸ as fast as the points r^3 r^4 recede downstream, thus keeping the chains perpendicular. By this means, as soon as the chains become shortened to an extent sufficient to require it, they assume a perpendicular position and retain it while the gate is being raised and lowered, as desired.

As before stated, the frame D² is mounted upon the rails g^3 by flanged wheels g^4. By this means I gain two important advantages: First, where two or more of the gates are arranged close together, which is generally the case, by extending the truss-frames B′ B² B³ B⁵ and the frame D′ and tracks g^3, the frame D² may be moved along from one gate to the other, and thus utilize one hoisting apparatus for any desired number of gates, it being only necessary to disconnect the chains *r*′ *r*² from the drums E′ E² to release the hoisting apparatus; and, second, which is by far the most important advantage, the mounting of the frame D² upon the rails g^3 renders itself adjustable to the lengths of the chains *r*′ *r*², so that both ends of the gate are acted upon with a perfectly-equal power, no matter whether any variation in the length of the chains exists or not. If one chain, *r*′ or *r*², happens to be longer than the other, the frame D² will be moved along the rails by the short chain until the slack of the long chain is taken up, before they begin to act upon the gate, and the gate will consequently be acted upon with a perfectly-uniform strain on each side, and one side will never be raised ahead of the other. By this means the gate will never be strained or wrenched by unequal strains from the hoisting-power.

If the hoisting apparatus is used only on a single gate, the rails g^3 and wheels g^4 might be dispensed with, and the frame D² arranged to rest loosely upon the timbers D′, as the slight movement to which the frame is subjected by the possibly unequal lengths of the chains *r*′ *r*² would not be retarded by the absence of the wheels g^4. When used on a single gate, the guide-drums E⁷ E⁸ would generally be mounted directly by bearings upon the timbers D′ D′, and the frames D³ D⁴ dispensed with.

The ends of the gate-facing planks C⁴ are strengthened by supporting-strips C⁹, attached across them, the edges of these strips C⁹ being adapted to fit the sides of the piers very closely when the gate is down. Toward their upstream sides the strips C⁹ are cut away, as at *v*, leaving a V-shaped slit between the strips and the walls A′ A² of the piers, into which sediment can gather and become embedded and form a packing and render the gate water-tight. If enough sediment is not present in the water, then a small quantity of earth thrown in above the gate will be carried into the tapered joint *v* by the current, and become packed therein and close the joint and make it water-tight. In Fig. 7 an enlarged sectional detail of this feature of my invention is shown.

W represents a brace or rod to support the operator while operating the wheel F′ F² F³ by his feet.

Having thus described my invention, what I claim as new is—

1. The combination, with a sluiceway-gate, of a hoisting apparatus consisting of a frame, D², having spirally-grooved chain-drums E′ E², adapted to be revolved and connected to the sides of said gate, said frame D² being movable in a line across said gate, whereby the tension of said chains is equalized, substantially as set forth.

2. In a sluiceway-gate, the combination, with said gate, of a truss-frame, D′, supported on piers A′ A² above said gate, frame D², having spirally-grooved drums E′ E², adapted to be revolved, spirally-grooved guide-drums E⁷ E⁸, and chains *r*′ *r*², connecting said gate with said drums E′ E² over said drums E⁷ E⁸, substantially as set forth.

3. The combination, with a sluiceway-gate, of truss-frame D′, supported on the piers of said gate, frame D², freely movable along said

truss-frame, spirally-grooved drums E′ E², gears E⁵ E⁶ on the shaft of said drums and engaged by one common pinion, E⁴, on shaft E³, chains r' r^2, connecting said gate with said drums, and a wheel connected to and adapted to revolve said shaft E³, consisting of clutch-hub m' m^2, central grooved rim, F′, side rims, F² F³, connected to said central rim by rounds i', and a brake-rope, n', substantially as set forth.

4. In a sluiceway-gate, piers A′ A², provided with straps a', united to the sub-foundation X of said piers by anchor-bolts, truss-frame consisting of main timbers B′ B² B³ B⁵ and braces B⁴, B⁶, and B⁷, said truss-frame lying across said sluiceway and secured to said piers by straps a^5, and bolts a^6, uniting its ends to said straps a', in combination with a sluiceway-gate consisting of arms C′, ribs C², facings C⁴, and braces C³, each of said arms C′ attached at one end to said ribs, and converging and encompassing bearings b' on said timbers B′, substantially as set forth.

5. In a sluiceway the piers whereof diverge from the bed of the sluiceway upward, a sluiceway-gate corresponding with said divergence and provided with self-adjusting guide C⁶, adapted to support said gate from side-thrust while being raised and lowered, substantially as set forth.

6. A sluiceway-gate consisting of arms C′, ribs C², facing C⁴, and braces C³, said arms converging and adapted to encompass bearing b' in truss-timbers B′, in combination with guide C⁶, adapted to permit the free perpendicular movement of said gate, but to prevent lateral movement, substantially as set forth.

7. A sluiceway-gate consisting of arms C′, ribs C², facing C⁴, and braces C³, each of said arms C′ attached by one end to said ribs and converging and united at their other ends, and adapted to encompass bearing b' on pivotal timbers B′, hard-wood bearing-blocks b^2, inserted in said arms to receive the strains of said bearings, and side plates, C⁵, adapted to unite said arms and support said bearing-blocks, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JEREMIAH BURNHAM TAINTER.

Witnesses:
C. N. WOODWARD,
H. S. WEBSTER.