(No Model.) 3 Sheets—Sheet 1.

J. B. TAINTER.

COFFER DAM, MILL DAM, AND SIMILAR WORKS.

No. 344,877. Patented July 6, 1886.

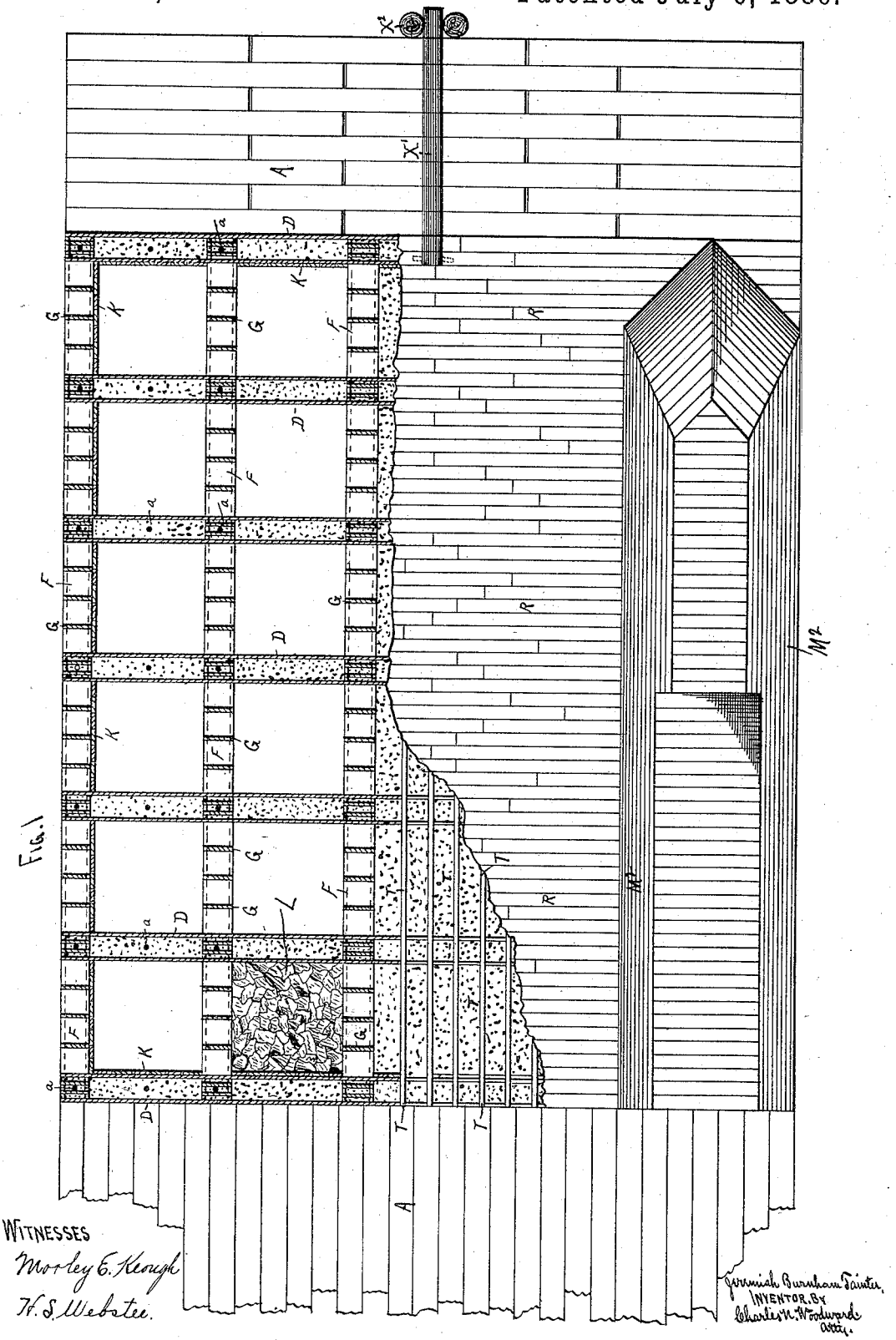

Fig. 1.

WITNESSES
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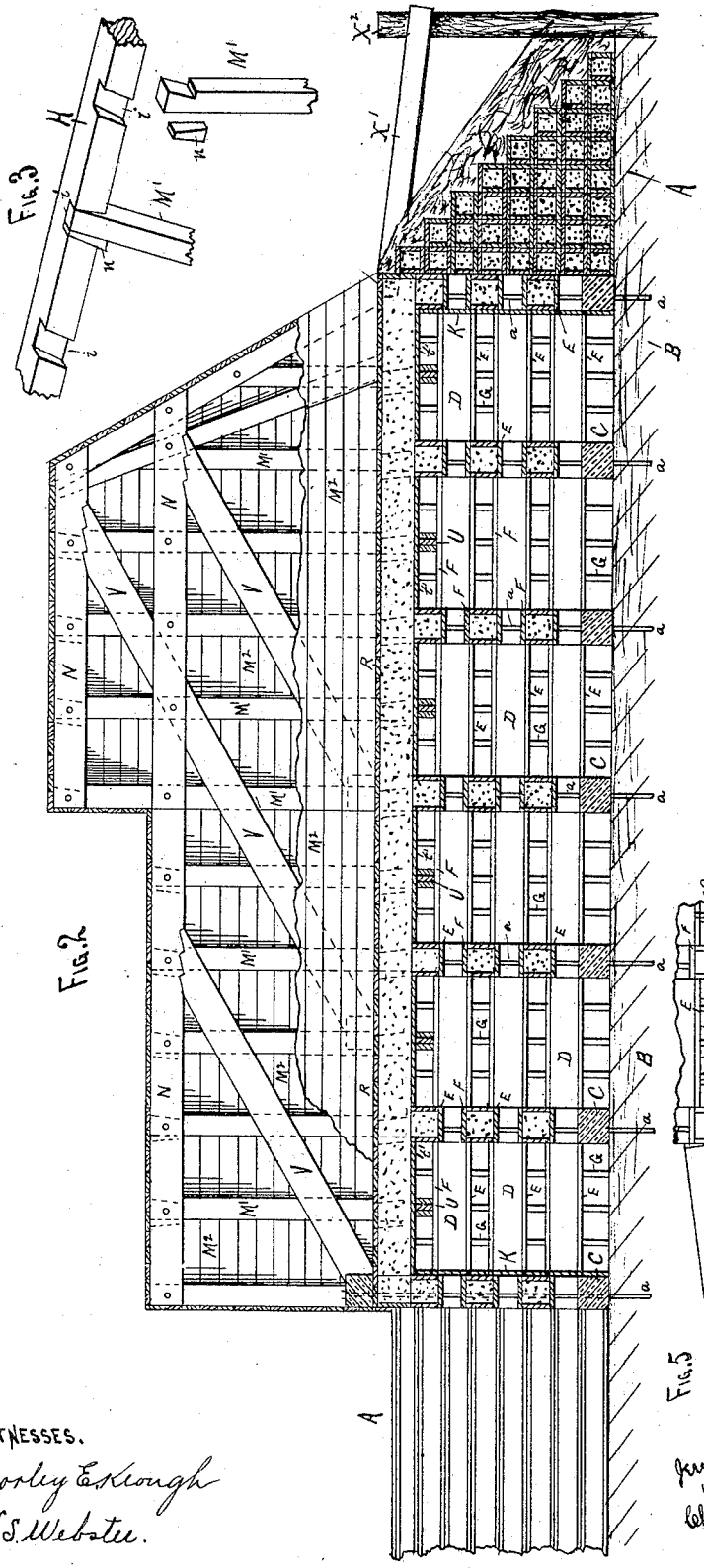

Fig. 2

Fig. 3

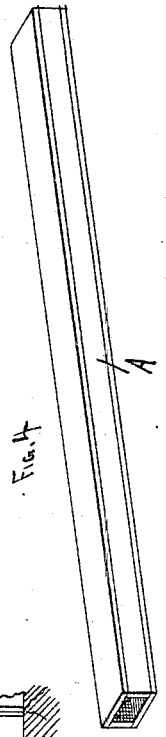

Fig. 4

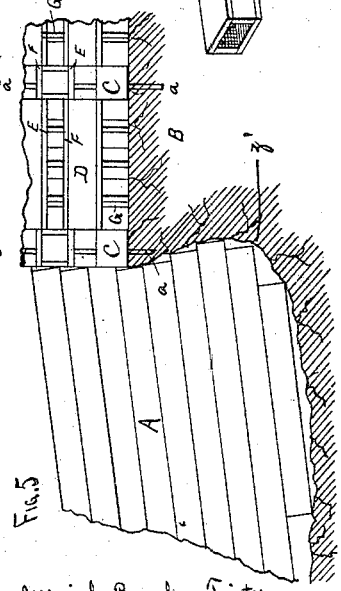

Fig. 5

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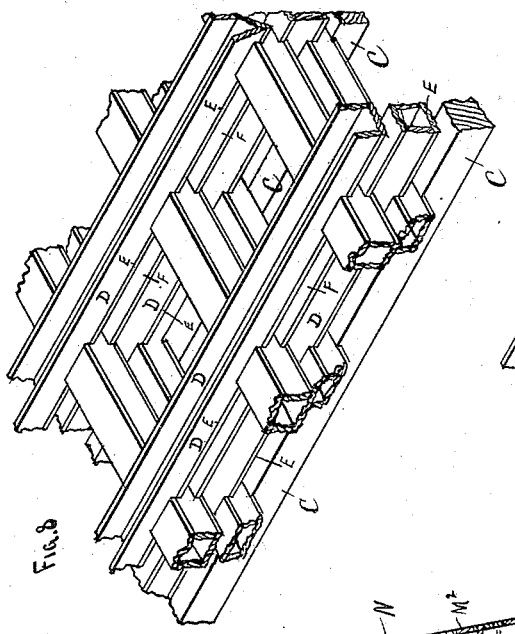

Fig. 8.

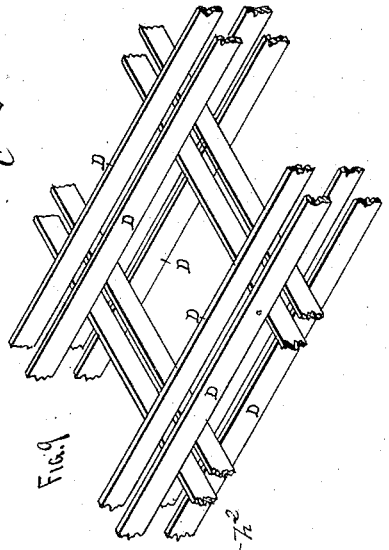

Fig. 9.

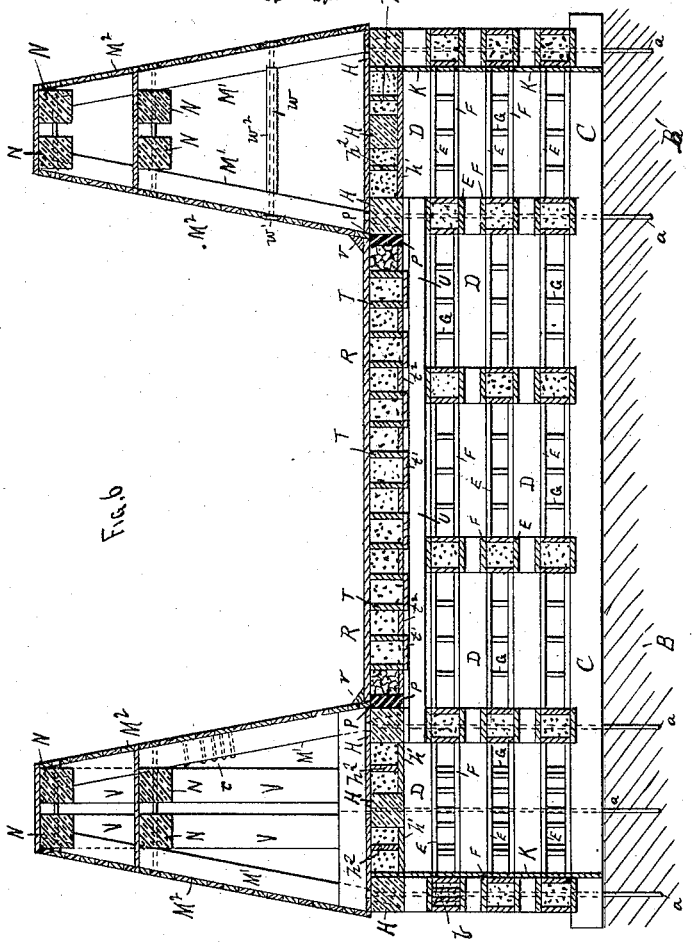

Fig. 6.

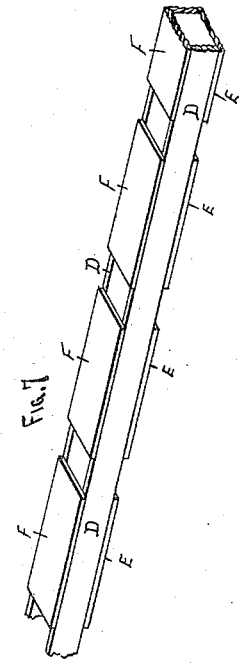

Fig. 7.

WITNESSES.
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UNITED STATES PATENT OFFICE.

JEREMIAH BURNHAM TAINTER, OF MENOMONEE, WISCONSIN.

COFFER-DAM, MILL-DAM, AND SIMILAR WORKS.

SPECIFICATION forming part of Letters Patent No. 344,877, dated July 6, 1886.

Application filed November 16, 1885. Serial No. 183,011. (No model.)

To all whom it may concern:

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

Figure 1 is a plan view, partially in section, of a dam constructed on the principles embodied in my invention. Fig. 2 is a sectional side elevation of the dam as shown in Fig. 1. Fig. 3 represents perspective details of a portion of the timber-work, illustrating the manner of securing the parts together. Fig. 4 represents a detached perspective view of one of the concrete casings or boxes used in forming coffer-dams and approaches to mill-dams. Fig. 5 is a sectional detail of a portion of a dam, showing the manner of forming an "apron" to a dam with my improved loaded casings. Fig. 6 is a cross-sectional view of the dam. Fig. 7 represents a detached perspective view of one of the concrete casings or boxes used in the construction of mill and similar dams. Fig. 8 is a perspective view of a section of the frame of the foundation of the dam shown in Figs. 1, 2, and 6. Fig. 9 is a view similar to Fig. 7 when partially completed.

This invention consists in forming coffer-dams, mill-dams, dikes, and similar works with a series of casings or boxes filled with concrete, stone, or other heavy material adapted to be sunken where the dam is to be constructed. One of these casings is shown in Fig. 4, and will usually be constructed of uniform size, of plank or boards, so that when filled with concrete or stone they may be piled uniformly, as at A in Figs. 1 and 2, leaving no open spaces between the sides of the boxes. When thus constructed in streams having a large amount of sediment floating in the water, the sediment gathers between the sides of the boxes and forms a water-tight packing, which effectually prevents the passage of water. When used in streams having no floating sediment, then a small amount of clay or earth will be thrown into the stream above the dam, which the force of the water soon packs in between the planks and renders the dam water-tight. This is one modification of the invention, and will be found very advantageous where a coffer-dam is required, and may also, under some circumstances, be used for a permanent dam. When used for a permanent dam, however, I generally prefer the modification shown in Figs. 1, 2, 6, 7, and 8, in which the concrete or stone filled casings are shown arranged to form cribs in which concrete or stone filling is placed, this form requiring a less number of the casings, while at the same time producing a dam of equal strength to the other form shown at A.

If the place where the dam is to be built is in a stream having a rock bottom, a coffer-dam is constructed with the concrete-filled boxes (shown in Fig. 4) above the point where the dam is to be placed, and the ledge or rock cleared of mud, loose stone, and other débris. If the bed of the stream is formed of earth or clay, then a combined pile and concrete sub-foundation will be first constructed, or the sub-foundation may be constructed entirely of the loaded casings by sinking them across the stream, and thus building up to the required height. In this connection a very important advantage is gained by the use of the loaded casings, and that is the ability to build a dam or foundation of any required size without first building a coffer-dam or otherwise shutting out the water. When the bed of the stream is of rock, the sediment and loose stones can usually be raked off, leaving the bed comparatively level. If the amount of sediment is too great to be removed, then the bottom will be leveled as well as possible. Then a layer of the loaded casings is laid across the stream in close proximity and another layer upon top of them, and so on as high as required. This can be easily done without shutting off the water, in the same manner as submarine work is frequently done where stone instead of the casings are used. A series of foundation-bolts, *a*, will be set at suitable intervals in the rock or sub-foundation B, as the case may be, and arranged to project upward through the successive layers of concrete-filled boxes forming the cribbing, by which the final top or tie timbers may be secured to the cribbing, and the latter then firmly connected to the sub-foundation or rock ledge of the stream-bed. A row of timbers, C, are then placed on the ledge or sub-foundation B crosswise of the stream, with the foundation-rods

a passing up through them. These timbers C are placed as far apart as it is intended the cribs shall measure in width, each timber thus being the bottom of one wall of a crib. Pairs of planks D of any required size, but generally two inches thick and twelve inches wide, will be placed on edge eight inches apart across these timbers C, or up and down stream, at regular intervals, the spaces between the pairs of planks representing the length of the cribs. Before setting the planks across the timbers C, short pieces E will be spiked fast to their lower edges at intervals, leaving spaces between the ends of the short pieces to fit over the timbers C. Then across these first sets of planks D another similar set will be placed on edge, with similar short pieces, E, spiked to their under edges, to fill the spaces between the contiguous edges of the pairs of the first set of planks. The spaces between the planks D are then filled in with concrete or loose stone, or any other suitable filling, and short pieces F spiked over the upper edges of the planks D, between the contiguous edges of the cross-plank, the cribs being thus built up as high as may be necessary. In Fig. 8 sections of this plank-cribbing and the foundation-timbers C are shown in perspective, which clearly illustrates the construction.

In Fig. 9 a section of the cribbing is shown formed entirely of the plank D, the short pieces E F not being shown, while in Fig. 7 a pair of the planks D are shown with the short pieces E F in place thereon. The planking D E F will be built around the foundation-rods *a*, so that when completed the rods will project up through the corners of the cribs, and also through the short pieces E F at suitable intervals. Short pieces G will be inserted between the pieces E F at intervals, and also between the sub-foundation B and the lowermost set of pieces, E, so that all parts of the walls of the cribbing are supported and no long unsupported gaps left therein. Where the planks D cross each other short pieces will be inserted between them, so that the strains will not be borne entirely by the edges of the planks. A set of these short pieces are shown at *b* on the left side of Fig. 6, which is sufficient to illustrate their arrangement.

The dam as thus far described may be constructed of any size or for any purpose, but in the drawings it is shown as the bed of a sluiceway and the foundation for the piers of a sluiceway-gate, to which purpose it is peculiarly applicable. When the cribs have been built to the required height, a set of stringer-timbers, H, will be laid across the upper row of planks, D, (these stringers representing the width of the bottoms of the sluiceway-gate piers,) and secured in place by the foundation-bolts *a*, which pass up through them, as shown. By this means the cribs, base-stringers C, and pier-stringers H are all firmly secured together, and also to the sub-foundation B. A sheathing of planks, K, will then be set inside the outer walls of the outer rows of cribs to retain the loose stone or concrete filling with which the cribs will be loaded.

In Fig. 1 one of the cribs is shown filled with loose stone, (at L,) the others being left vacant, in order not to obscure the drawings; but in practice all the cribs will be loaded as fast as they are built, or afterward, as preferred. After the cribs are loaded with the loose stone or concrete filling up to a point even with the under side of the stringers H, the spaces between the stringers are filled in with planking *h'*, laid flatwise across the upper row of planks, D, and also provided with intermediate planks, h^2, set on edge on the planks *h'*, being even with the upper surfaces of the stringers H. The spaces between the stringers H and planks *h'* are then filled with concrete or loose stone. The outer edges of the outer stringers, H, before they are set in place across the cribs, will be provided with angular "gains" *i*, (see Fig. 3,) in which the lower ends of the timbers M', forming the side frame of the gate-piers, are fitted and held in place by keys *n*, as shown in Fig. 3. These timbers M' converge inward, and are fitted at their upper ends into stringers N by dove-tailed joints and keys in the same manner as their lower ends are secured in the stringers H, and as shown in Fig. 3. The stringers H and N and side timbers, M', are then bolted together. The timbers M' are about three feet apart, and form a frame to which the sheathing M^2 is spiked, the spikes being long enough so that they can be "clinched" on the back side of the timbers M, as indicated at *r* in Fig. 6. After the timbers M' are set in place timbers P will be spiked or bolted against the inner sides of the inner stringers, H, as shown in Fig. 6, these timbers P being thick enough to project far enough beyond the sheathing M^2 of the piers to form a support to the ends of the flooring R of the sluiceway. Joists T will be placed at short intervals across the upper row of planks, D, to form supports to the floor R, and the under edges of these joists will be supplied between the planks D with short pieces *t'*, similar to the short pieces E of the planks D, and between the joists T planks t^2 will be inserted, resting across the upper row of planks, D. These pieces *t' t²* form supports for a concrete or stone filling between the joists T, as shown. Intermediate supporting timbers or joists, U, will be arranged across the dam beneath the joists T at suitable intervals to support the joists above the cribs, so that no long unsupported gaps occur, the ends of the supports U resting on the planks F of the upper up-and-down-stream set of crib-walls, as shown.

r represents corner-pieces spiked into the corners formed by the floor R and sheathing M^2, to form an additional support at these points, and to prevent logs, &c., from catching upon the flooring or sheathing and tearing them loose. The space between the timbers P and the nearest or adjacent joist T will be

occupied with a loose filling of stone, so that in case of needed repairs or replacing of the piers the filling may be easily removed to enable the timbers T and M′ to be removed and replaced without disturbing the remainder of the dam. This is a very important feature of my invention, as the piers, which are subject to very severe strains by water, ice, logs, &c., require frequent repairs and renewal, and by this manner of constructing them they can be readily repaired or replaced without disturbing the remainder of the dam. If the piers are to be filled with concrete, then it is merely necessary to pour it in as fast as the sheathing M^2 is placed, spaces being left between the stringers N for the insertion of the last amount of the filling. When a concrete filling is used in the piers, cross tie-rods *w′* will be arranged at suitable intervals to support the timbers M′ between the stringers H and N, each of the rods being protected from the concrete by a tube, w^2, encompassing it inside the pier, so that the concrete will not "set" upon the rods and prevent their removal in repairing and replacing the piers. These tie-rods *w′* may also be used in piers in which no concrete filling is used, if required.

In the drawings, in Fig. 6 I have shown on the right a pier arranged to be filled with concrete, with one of the tube-protected rods *w′* shown therein, and on the left a pier arranged without filling, but supplied with a system of brace-timbers, V, to give it stability. The manner of arranging these brace-timbers is more clearly shown in Fig. 2, where it will be observed that they are set to brace the pier "upstream," or against the current. The piers are also shown inclined backward, and with pointed forward ends, to offer as little resistance to the water as possible.

In Fig. 5 is illustrated another use to which the loaded casings can be put, which is a very important one. After the dam is completed the water, in pouring over the downstream end of the dam, soon wears away the bed B of the stream close up to the dam, forming a hollow place, and if neglected this hollow place would soon be enlarged by the constantly-whirling water and undermine the dam. To prevent this wear from affecting the dam injuriously, the hollow is usually filled with loose stones or piling, or the water is drawn off, and what is known as an "apron" built into the hollow to carry the water over and prevent its undermining the dam. After the dam is completed the water is allowed to run until it has formed considerable of a hollow space, as shown at *z′* in Fig. 5, and this hollow space is then filled with the loaded casings A, which prevent the water acting upon the bed of the stream. If the water in pouring over the casings wears away the bed of the stream below them, and even undermines them, no harm can accrue to the dam itself, as the casings only will be affected, and they can be easily replaced, or others added to supply the deficiency.

In Figs. 1 and 2 is shown an iron or wooden bar, X′, hinged by one end in the forward or upstream edge of the dam, lying, when not in use, upon the bed of the stream, (pointing upstream,) and held from side-play by piles or timbers X^2.

When the dam is to be repaired, the bar X′ is raised up to form a central support to a cross-timber, against which the upper ends of sheet-piles will be supported to form a temporary coffer-dam to shut out the water while the repairs are being conducted.

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

1. A dam constructed of wooden casings filled with concrete, stone, or other similar suitable material, and arranged to form the side walls of cribs, said cribs being filled with concrete, stone, or other similar suitable material, substantially as set forth.

2. In a dam, the combination of plank D, set in pairs across each other to form the side walls of a series of cribs, intermediate top and bottom pieces, F E, upon said plank, whereby they are formed into casings to support a filling of concrete, loose stone, or other similar suitable material.

3. A dam formed of side plank, D, set in pairs across each other to form the side walls of a series of cribs, intermediate bottom pieces, E, and intermediate top pieces, F, attached to the top and bottoms of said side plank, whereby casings are formed to support a concrete, stone, or other similar suitable filling, cross-supports G, between each adjacent pair of said intermediate top and bottom pieces, bottom stringers, C, top stringers, H, and tie-bolts *a*, substantially as set forth.

4. A dam formed of side plank, D, set in pairs across each other to form the side walls of a series of cribs, intermediate bottom pieces, E, and intermediate top pieces, F, attached to the top and bottoms of said side plank, whereby casings are formed to support a concrete, stone, or other similar suitable filling, bottom stringers, C, top stringers, H, tie-rods *a*, and floor R, in combination with a pier supported upon said cribbing, and consisting of converging timbers M′, connected at their lower ends by detachable key-joints to said stringers H, and similarly connected at their upper ends to stringers N, sheathing M^2, and brace V, substantially as set forth.

5. The combination, with a mill-dam, of a bar, X′, hinged by one end to the upstream edge of said dam, and lying upon the bottom or bed of the stream when not in use, and adapted to be raised upward to form a support to a coffer-dam across said dam, 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.