

(No Model.)

4 Sheets—Sheet 1.

J. Du BOIS.
Lock and Dam.

No. 236,488.

Patented Jan. 11, 1881.

Fig. 2.

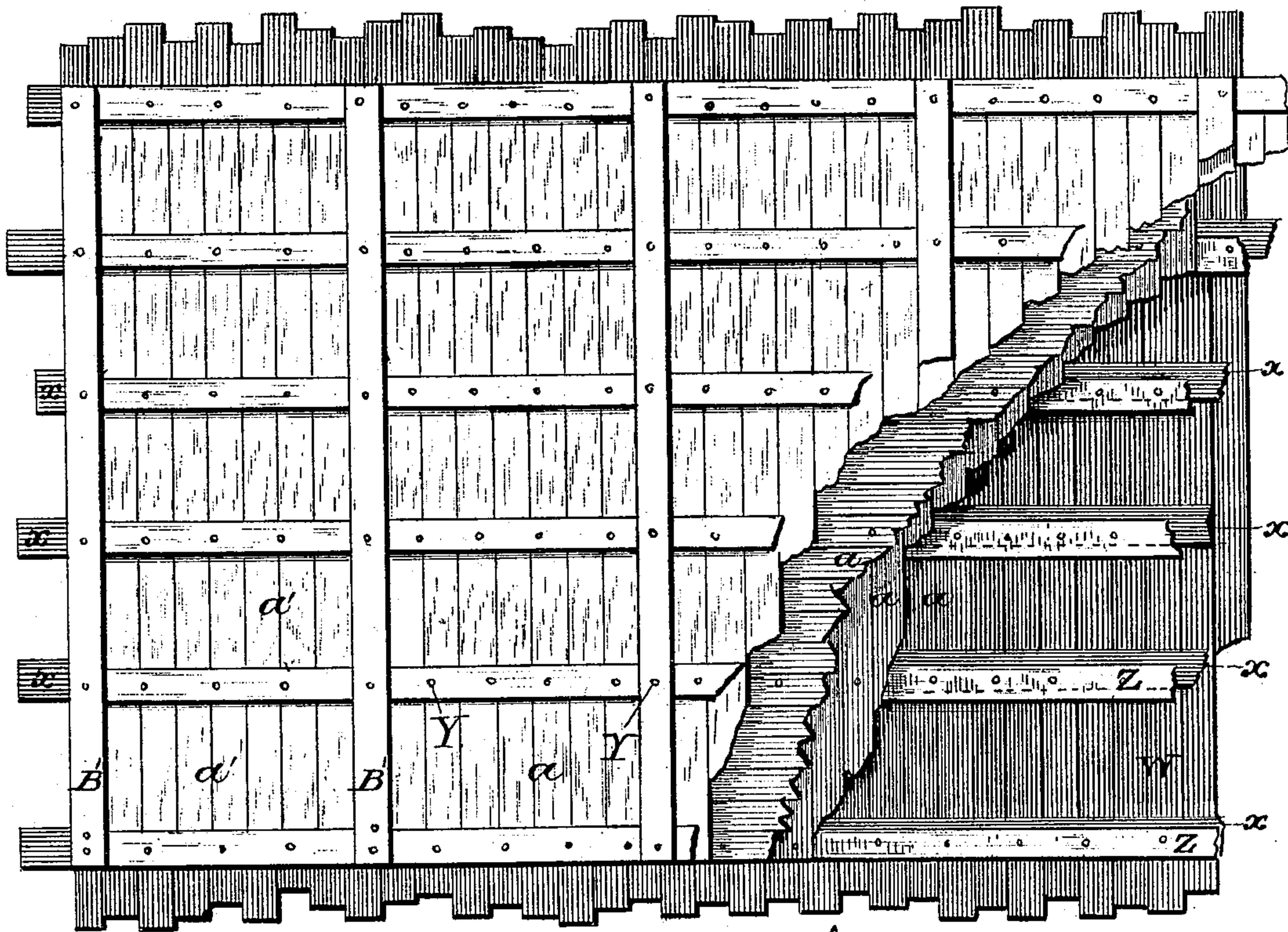


Fig. 3. c

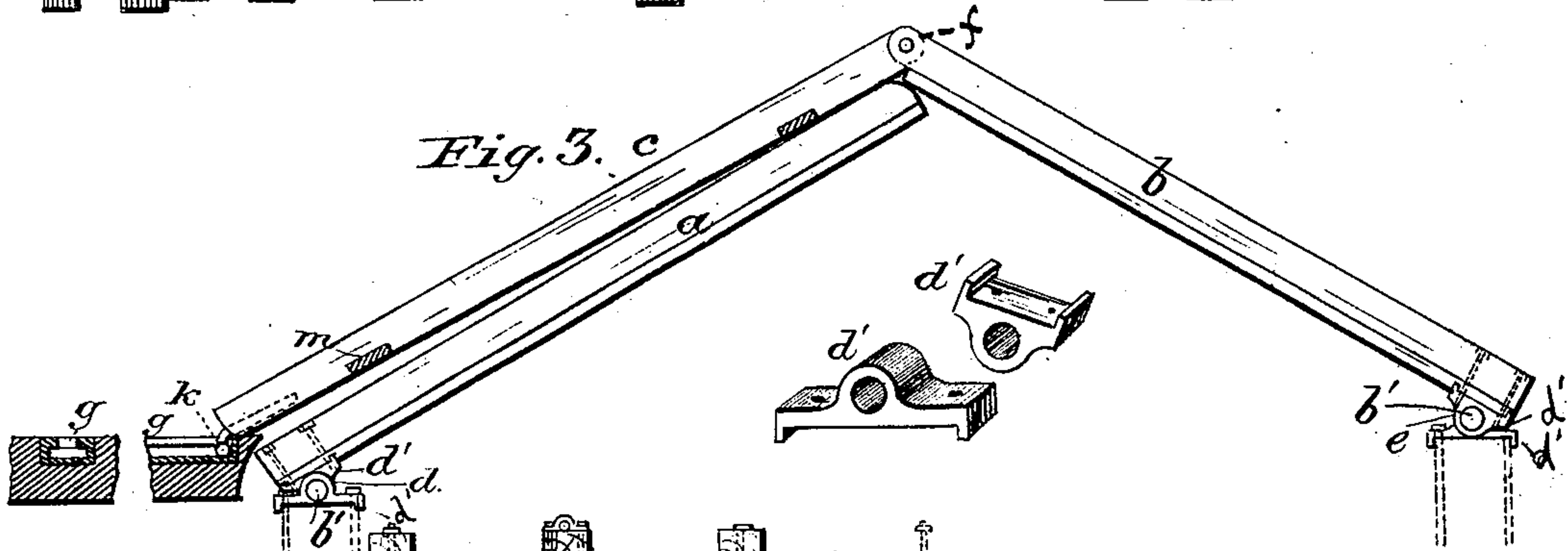
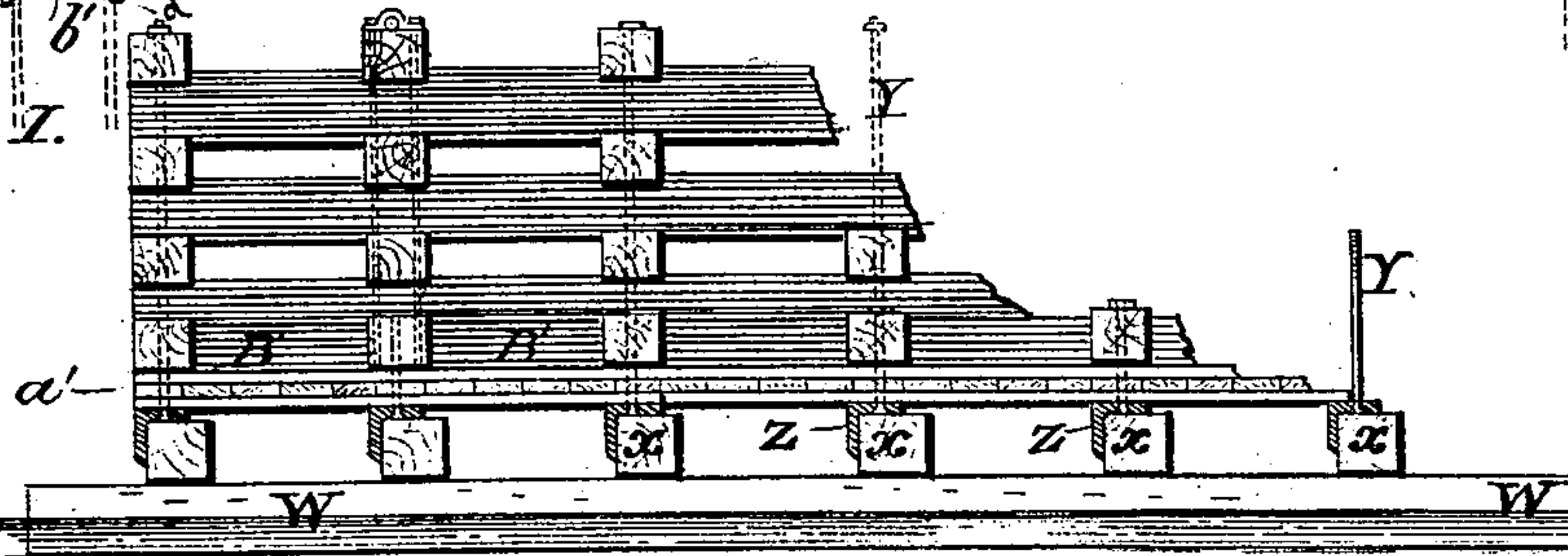


Fig. 1.



Witnesses.

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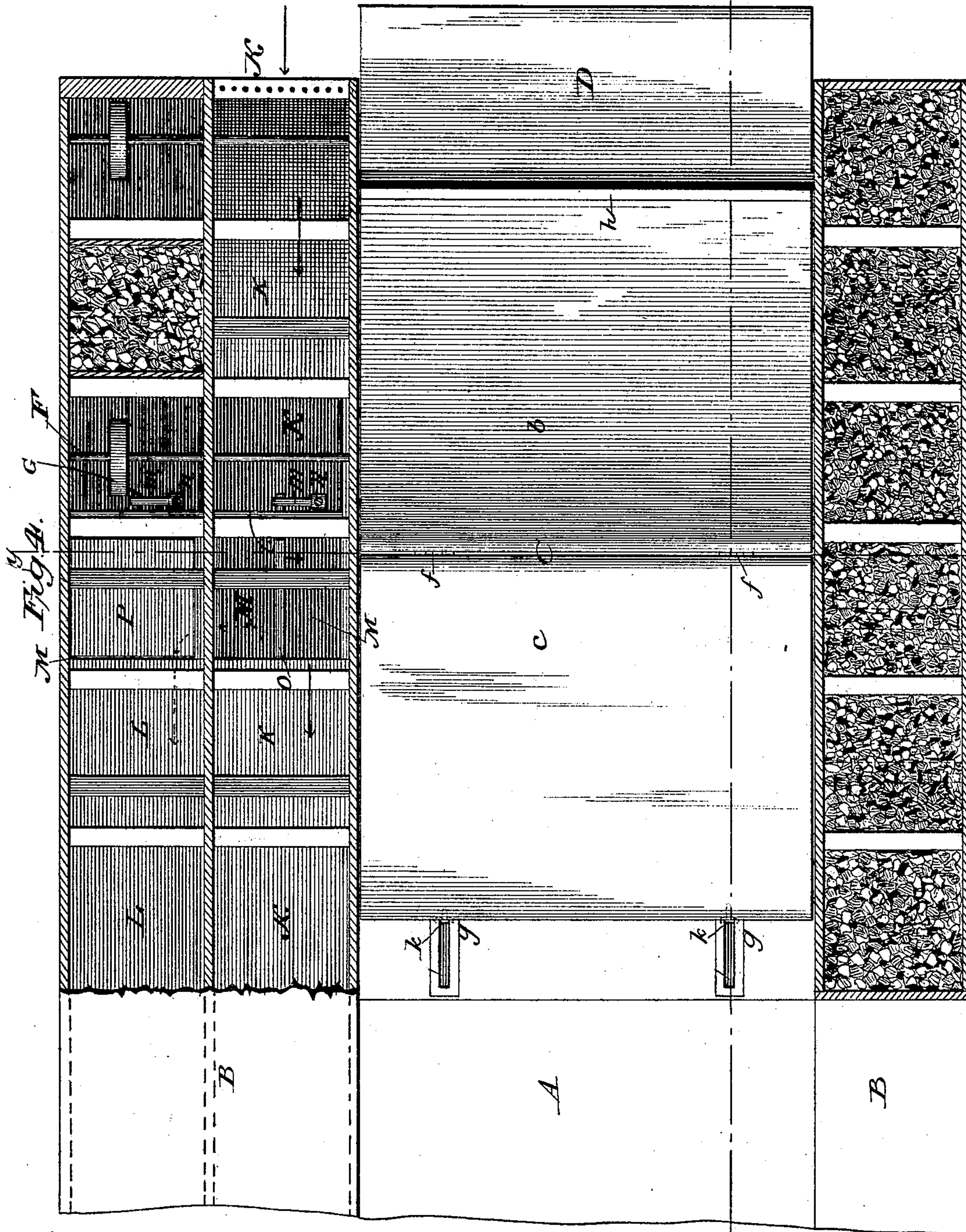
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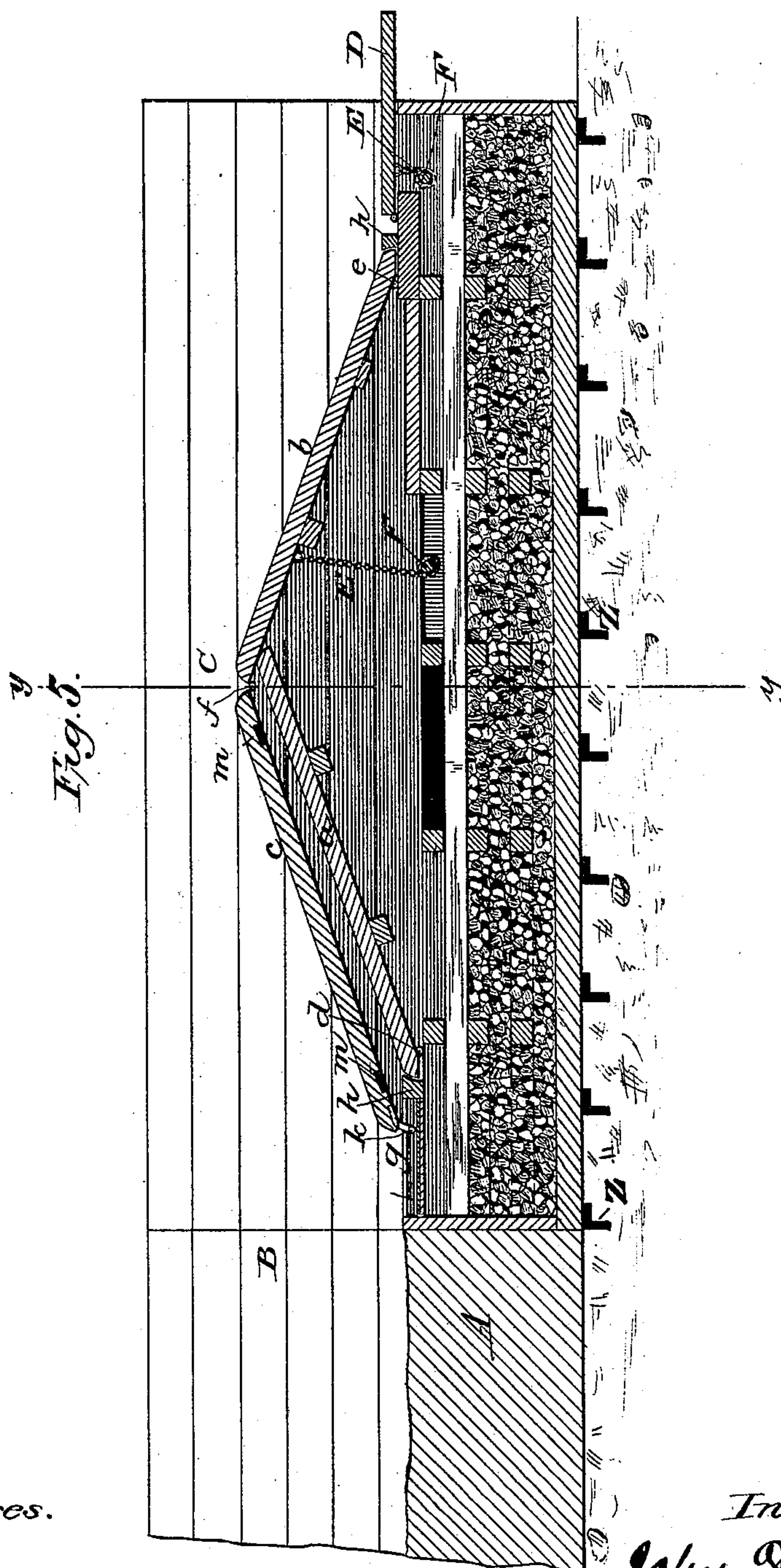
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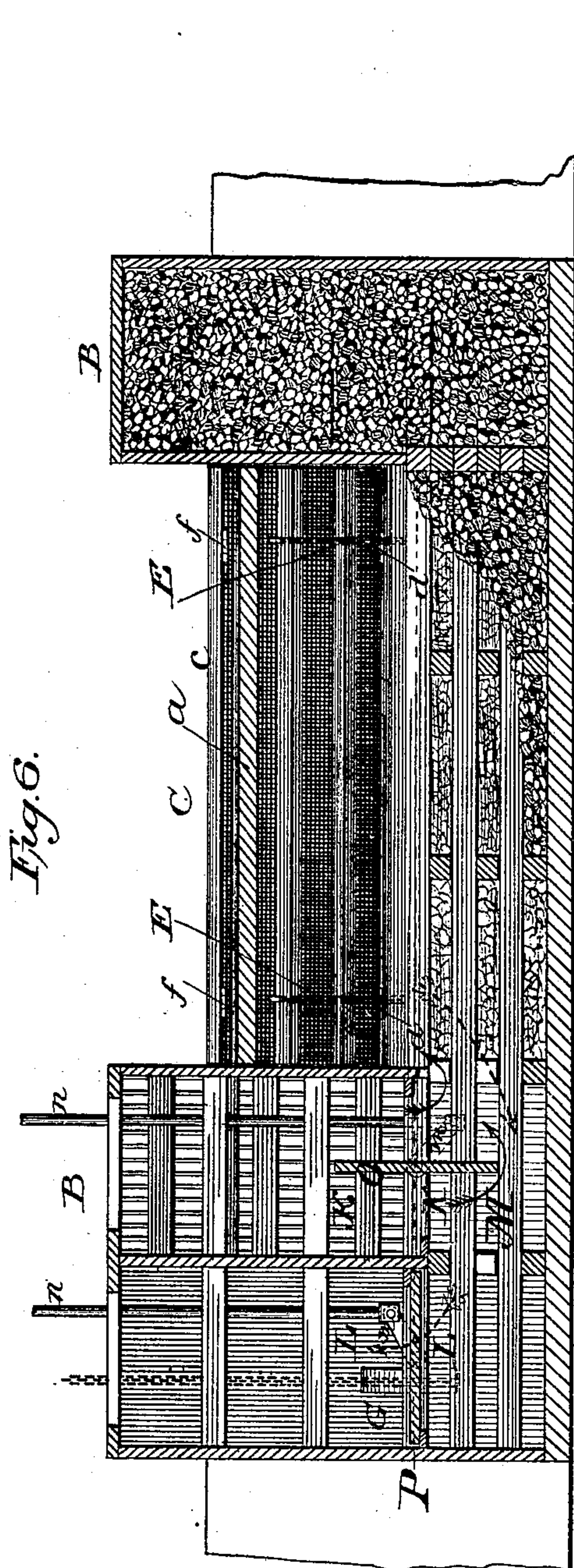
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4 Sheets—Sheet 4.

J. Du BOIS.
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UNITED STATES PATENT OFFICE.

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LOCK AND DAM.

SPECIFICATION forming part of Letters Patent No. 236,488, dated January 11, 1881.

Application filed September 24, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN DU BOIS, of Du Bois, in the county of Clearfield and State of Pennsylvania, have invented certain Improvements in Locks and Dams, of which the following is a specification.

This invention relates to that class of dams and gates which are made in sections and raised by admitting water beneath them from the pool of the dam and lowered by permitting said water to escape. The principle has long been known and used in flumes for creating and letting off artificial floods, passing logs, &c. A patent bearing date the 6th day of July, 1880, was granted to me for an improvement in building locks and dams on the same principle for use in large streams.

The present invention is designed to remedy certain defects in the plan described in the patent and to materially cheapen the cost of construction.

Instead of building the lock or dam upon ways built upon the shore, as in my previous system, I now raft a portion of the timber that is to be used for the crib-work of the lock or dam and place thereon, at suitable distances apart, cross-timbers, to serve as temporary supports for the angle-irons or mud-sills employed on the base of the permanent or final structure in the same manner as in the former patent. The angle-irons or sills, having the fastening-bolts applied to them in a vertical position, are then laid lengthwise upon the cross-bars, which serve to give them temporary support. A flooring of strong plank is then laid across the angle-irons or sills, a layer of well-seasoned boards laid upon and across the flooring-plank, and, finally, another course of plank laid upon and across the boards, thus producing a strong and tight bottom. The bolts, which are riveted or otherwise secured to the angle-irons, extend upward through and above the flooring to receive and hold the timbers forming the superstructure. As soon as the flooring is completed the first course of timber of the foundation or superstructure is laid thereon over and around the bolts and forced down tightly and firmly in place by the application of nuts to the bolts. The foundation thus formed is a structure capable of sustaining the weight of the crib-work forming the body of

the main structure. I next proceed to withdraw the rafted timber from beneath the structure and then build the superstructure thereon in the same, or substantially the same, manner as described in the original patent, after which the entire structure is loaded and set finally and permanently in position, this operation being also carried out in the manner stated in the previous patent. By the above method of construction I save a large amount of expense as compared with my original method, and also avoid the risks and dangers incident to the launching the immense structures from land.

Jointed gates adapted to be elevated by admitting water beneath them have been in use many years. The original gate of this class, known ordinarily as the "bear-trap" gate, consisted of two sections held by hinges at their outer ends and lapped and arranged to slide one upon the other at the inner ends, as the latter rose and fell. This gate could only be used in narrow chutes or flumes, and was only used for the purpose of raising artificial floods and passing logs, &c., when the water was let out of the pool. It possessed grave defects, as it had to be let entirely down before logs were allowed to pass over it, on account of the otherwise perpendicular fall from the top of the upper section to the surface of the lower one. In small streams and under high heads too much water was let off and the logs were thrown out upon the banks, while at the same time the pool was exhausted with but little benefit.

To remedy the above defects I devised a gate for which I received Letters Patent bearing date September 2, 1862, No. 36,342, in which the two sections had their inner ends hinged together, while the outer or lower end of the lower section was hinged to the dam and the outer end of the upper section arranged to slide on the dam as the gate rose and fell. This answered the purpose for which it was designed by giving, under all adjustments, a gradual descent from its top or highest point downward. On testing the gate practically I find that it will not answer as a dam for large streams, for the reason that the accumulation of mud, gravel, and other obstructions would in some cases prevent the movement of the

sliding end and in other cases subject the gate in closing to severe and dangerous strains, causing wear and injury and necessitating frequent repairs. Other difficulties of minor importance not necessary to be enumerated were also encountered.

In order to overcome all the troubles above enumerated, I now construct the gate in three sections. The two main sections are hinged to the foundation or dam at their outer ends, and the lower end of the upper section lapped over and arranged to slide upon the upper end of the lower or downstream section in substantially the same manner as in the bear-trap gate. To the lower end of the upper section I hinge the third section, allowing its lower free end to overlap the lower section. This third section forms an apron and produces under all adjustments an unbroken gradual descent from the top of the upper section to or over the lower section. The third section or apron is ordinarily made of such length as to entirely cover the lower section when the gate is at its greatest elevation, and in such case the lower end of the apron is permitted to slide upon the foundation, and is connected thereto by sliding joints or guides, which serve to limit the movement of the apron and prevent the gate from being raised too high. When the gate is at its highest elevation the apron should rest firmly on top of the lower section, so as to give the dam increased strength at the time of the greatest strain. The apron, in addition to affording the gradual descent and giving the increased strength, also serves to protect the hinge of the lower section, and avoids all the former troubles from the accumulation of mud, &c.

It is preferred to employ as the sliding connection of the apron T-headed bolts, or their equivalents, arranged to slide in slotted plates secured to the foundation; but any other suitable connection may be employed.

While it is preferred to have the apron completely cover the lower hinged section of the gate, good results may be secured when the apron covers only the upper part of said section. In the latter case the apron will have its lower end united by sliding connections to the said section instead of the foundation.

In place of the eyebolts used in my previous dam to secure the hinge-rod, I now employ metal blocks secured by bolts, which are preferably fastened to the angle-irons on the bottom, the better to unite the gates to the foundation, as hereinafter described in detail.

In constructing a lock with its two gates I now use, instead of the two flumes on opposite sides, one to admit the water to and the other to discharge it from the gates, as in my patent of July 6, 1880, a double flume located on one side. The section which admits water under the gates is open at its upper end and closed at its lower end, while the one that discharges the water from beneath the gates is

open at the lower and closed at the upper end. A connecting chamber or passage is made under and across the entire flume opposite each gate, and small gates or wickets arranged to control and direct the course of the water, as required.

In the practical use of the lock it is necessary that the gates shall be depressed beneath the level of the standing water, in order that boats, &c., may pass over them. This depression of the gates may be secured by making them buoyant and providing means to force them down, or by adapting them to sink in the water and providing means for forcing them up. In my present improved structure I make use of the first-named plan, using chains and winding-drums, or equivalent mechanism, actuated by means of a water-wheel, or manually, or otherwise, to compel the descent of the gate beneath the water. Supplemental gates applied to the ends of the lock to exclude the water during repairs may be depressed in the same manner.

The accompanying drawings fully illustrate my improved structure and the method in which it is constructed.

Figure 1 is a side elevation, showing the manner in which the structure is commenced upon the rafted timber. Fig. 2 is a top-plan view of the same. Fig. 3 is an enlarged view, showing the construction of the improved gate. Fig. 4 is a top-plan view, showing one end of a lock with the improved gate and flumes therein. Fig. 5 is a longitudinal vertical section of the same on the line *xx*, Fig. 4; Fig. 6, a transverse vertical section on the line *yy*, Fig. 4.

Referring to Figs. 1 and 2, *W* represents the rafted floating timbers upon which the structure is commenced and temporarily sustained. *X* represents the cross-bars or timbers laid upon the timbers *W*, and supporting the angle-irons or mud-sills *Z*, which are placed thereon with one edge extending downward at the side of the bars, as shown. *B'* represents the timbers forming the base of the permanent structure laid upon the flooring *a'*, which in turn rests upon the angle-irons. *Y* represents the vertical bolts secured to the angle-irons and extending upward through the structure to tie the same together. The timbers *W* and *X* are removed after the first course of crib-timbers are in place.

Referring to Figs. 3, 4, 5, and 6, *A* represents the formation or base of the lock; *B*, the side walls, and *C* the gate. The gate is clearly shown in Figs. 3, 4, and 5, in which *a* represents the lower section, hinged at its lower end, as shown at *d*, Figs. 3 and 5; *b*, the upper end, hinged at its lower end at *e'*, Figs. 3 and 5, and at its upper end overlapping the lower section, and *c* the third section or apron, having its upper end hinged to the free end of section *b*, as shown at *f*, Figs. 3, 4, 5, and its lower end hinged or connected to the base by the sliding joint *g k*. The sliding connection

consists of slotted plate *g*, secured to the base, and the T-ended irons *k*, secured to the end of the apron and working in the plates, as shown, so as to keep the apron down in place and also
 5 limit its end motion. The apron or section *c* entirely covers the section *a*, as shown, and when the gate is at its greatest elevation the two rest firmly against each other. The hinges which connect the sections *a b* to the base are
 10 clearly shown in Fig. 3. Bearing-plates *d'*, such as shown, each with a hole through it, are bolted through their ends firmly to the base and the gate. Pivot-rods *b'* are passed through and unite the plates *d'*, and, bearing
 15 against the faces of the base and gate, form a water-tight packing between them.

In order to stiffen and strengthen the apron, metal-bars *m* may be seated in its surface, as represented in Figs. 3 and 5.

20 The means for depressing the gate beneath the water consists, as shown in Figs. 5 and 6, of chains *E*, secured to the under side of the gate and winding upon a horizontal shaft, *F*, mounted in bearings in the base. The shaft
 25 is provided, as shown in Figs. 4 and 6, with an operating-wheel, *G*, at one end. This may be a water-wheel to be operated by the passing water, or a gear-band or chain-wheel to connect with manual device, a steam-engine, or
 30 other motor. The sliding-section *c* of the main gate and the chain used to depress the gate each serve as a connection to prevent the other sections from being carried so high as to separate at the top. Either of said devices will
 35 alone answer the purposes named under ordinary circumstances; but the two combined of course give additional security. The repair-gate *D*, located at the end of the lock to exclude water therefrom when required, is hinged
 40 to the base and connected with chains and a winding-rod in the same manner as the other gate.

Passing now to the flumes which conduct the water to and from the gates, *K*, Figs. 4 and 6,
 45 represent the inlet-flume, having an open upper end communicating with the pool above the gate and extending thence lengthwise in the lock past both of its gates and closed at the lower end. *L* represents the outlet-flume, com-
 50 mencing at the side of the upper lock-gate, *C*, with a closed end, and extending thence to the lower end of the lock, with an open lower end. A cross channel or passage, *M*, below the flumes communicates with the space under or
 55 within the gate *G*, and also communicates by gates *O* and *P* with the inlet-flume *K* and outlet-flume *L*, as clearly represented in Figs. 4 and 6. The flume-gates *O* and *P*, commonly known in the art as "wickets," are pivoted in the
 60 middle and provided each with a crank-arm, *m*, and rod *n*, by which they may be opened and closed by an attendant standing on top of the lock. When the wicket *O* is open and wicket *P* closed the water will enter the flume *K* from
 65 the pool and pass by the gate *O* into the transverse passage *M*, and thence into the space be-

neath the gate *C*, causing the same to rise. When wicket *O* is closed and wicket *P* opened the water will pass from beneath the gate through the transverse passage *M*, beneath the
 70 wicket *O*, and thence upward past wicket *P* into the discharge-flume *L*, by which it is conducted into the stream below the lock, thereby permitting the gate to descend. If the gate is
 75 buoyant, as described, the depressing mechanism is brought into action to submerge the gate beneath the standing level of the water in the lock.

Having thus described my invention, what I claim is—

80 1. The herein-described method of building and placing locks and dams, consisting in the following steps, viz: constructing a raft of timber, building upon said raft while it is float-
 85 ing a base or foundation structure adapted to float, removing the raft from beneath the base, building the superstructure upon the floating base, and finally sinking the completed struc-
 ture as a whole to its place.

2. The method of constructing dams and
 90 locks, consisting in first providing a temporary float in the water, next building upon said float a base or foundation for the dam or lock adapted to float, next removing the temporary
 95 float, and finally building permanently upon the floating base the main or super structure.

3. The process of constructing the herein-described gate or dam, consisting in first form-
 100 ing a raft of timber with cross-bars thereon, placing the angle-irons and bolts upon the said bars, placing the flooring and timbers above the angle-irons, fastening the angle-bars and parts above them together, and then with-
 drawing the raft-timbers and cross-bars.

4. The flexible gate or dam, consisting of two
 105 sections hinged at their distant and lapped loosely at their adjacent ends, and a third section hinged to one of the main sections and overlying the other.

5. In combination with two hinged co-oper-
 110 ating sections of a flexible gate or dam, a third section or apron, hinged to the upper main section and overlying the lower main section, substantially as shown and described.

6. A flexible water-gate or dam, adapted to
 115 rise and fall, consisting of a single leaf or section on the upstream side and two lapped sections or leaves on the downstream side.

7. In a water-gate or dam, the combination
 120 of two leaves or sections hinged at their distant and lapped at their adjacent ends, and a third section having one end hinged to one of the main sections and its opposite end secured by a sliding joint or connection, substantially
 125 as described and shown.

8. The combination of the sections *a b*, hinged
 130 at their ends and lapped one upon the other, and the apron *c*, hinged to section *a* and connected to the base or foundation by a sliding joint.

9. In a flexible rising-and-falling gate, two
 gate sections or leaves hinged at their outer

and lapped at their inner ends, and a connection, substantially as shown, to prevent the sections from rising so far as to separate.

10. In combination with the apron *c*, as described, the T-shaped heads and slotted plates
5 connecting the apron with the base of the lock.

11. In combination with the flexible buoyant gate or dam, positively-acting means, substantially as described, to depress the same
10 beneath the water-level.

12. The combination of the flexible buoyant

gate, means for depressing the same beneath the water, and a water-wheel for operating said mechanism arranged to be operated by the passing water.

13. The combination of the gate or dam, the flumes K L, passage M, and gates or wickets O P.

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Witnesses:

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