No. 610,548. Patented Sept. 13, 1898.

E. A. MANNY.

CANAL LOCK.

(Application filed Oct. 21, 1897.)

(No Model.) 3 Sheets—Sheet 1.

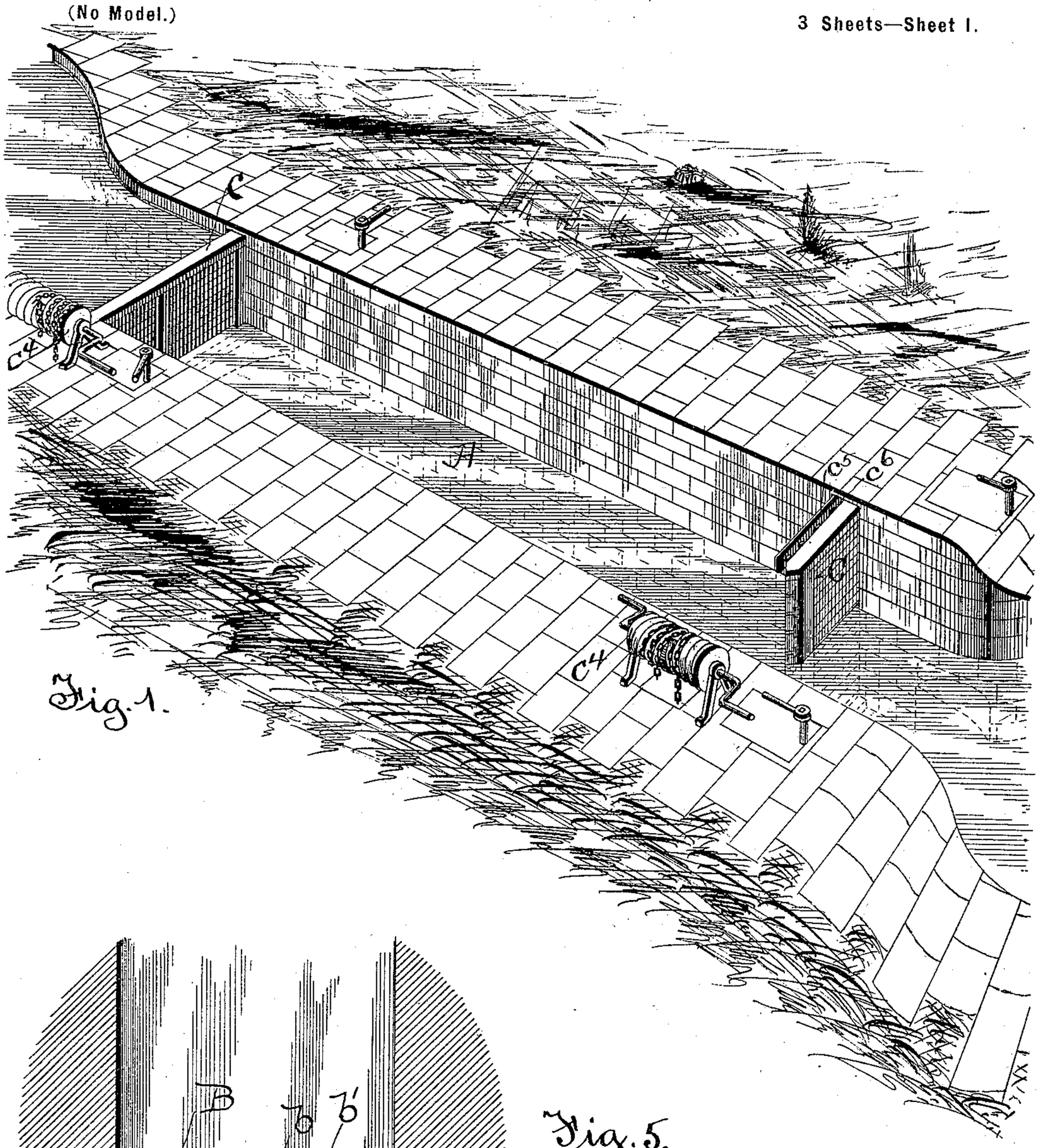

Fig. 1.

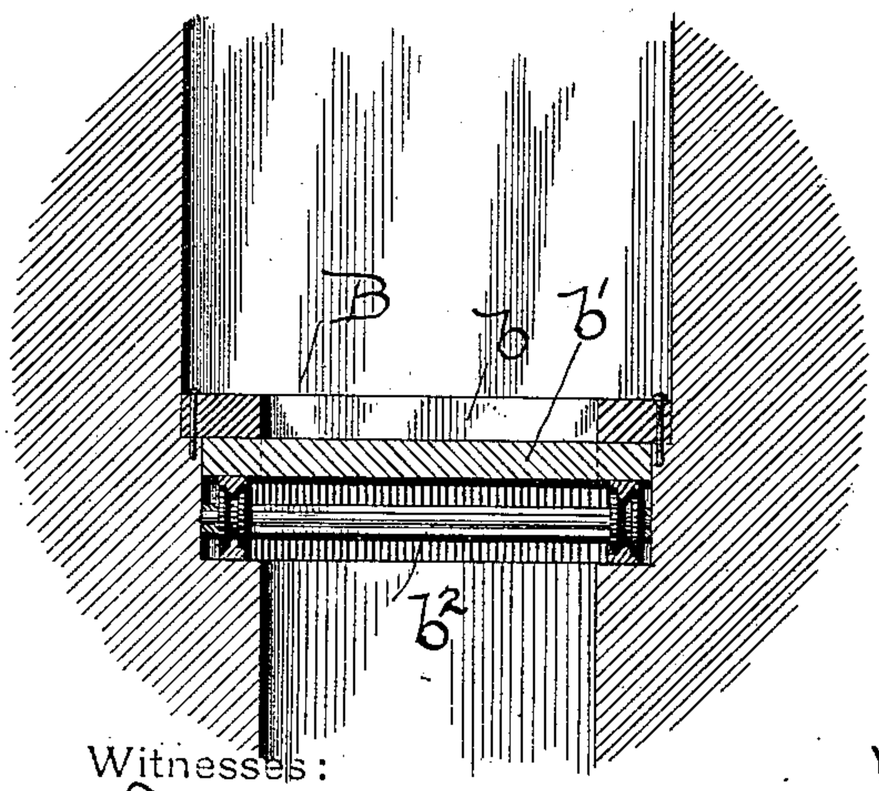

Fig. 5.

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3 Sheets—Sheet 2.

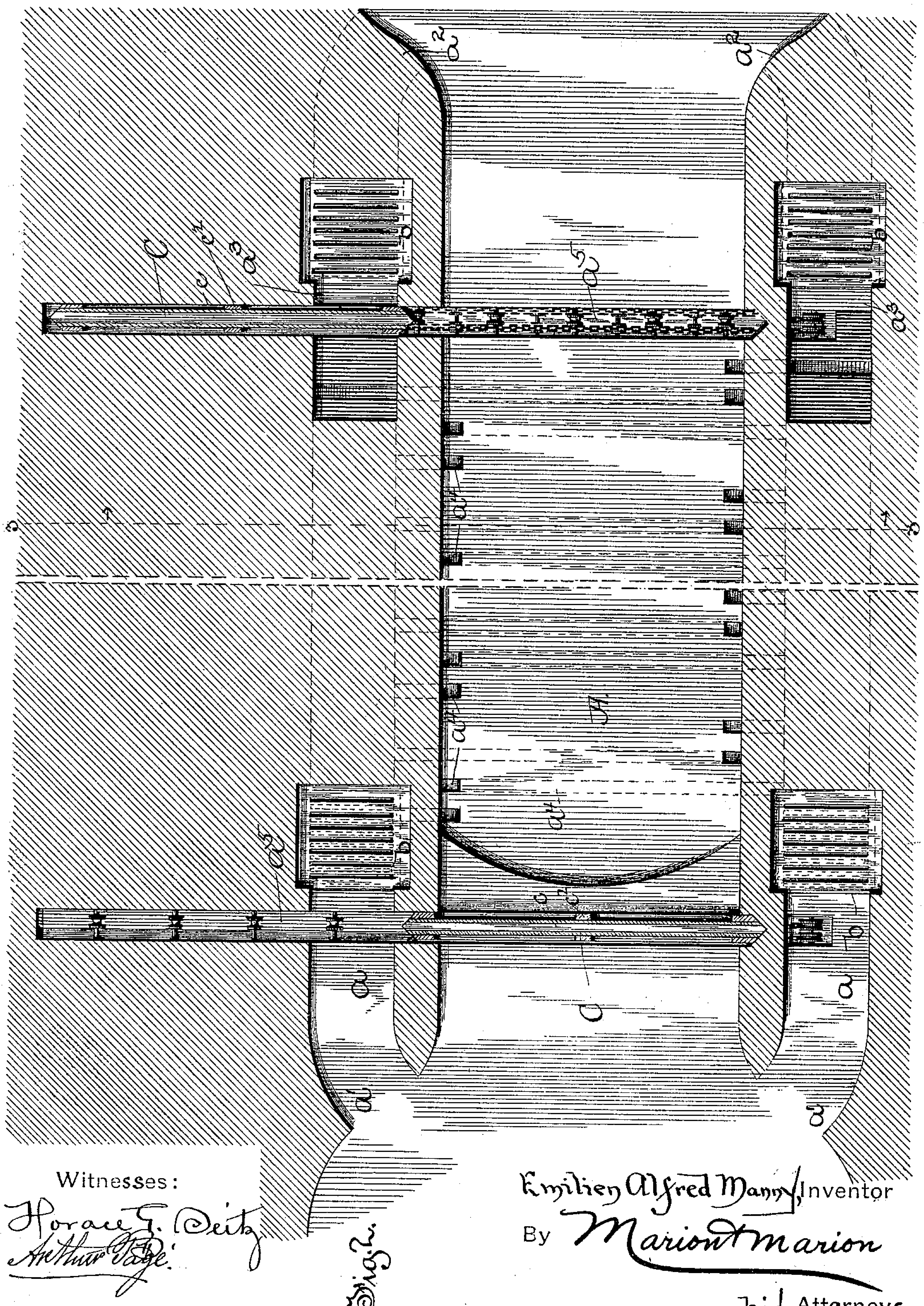

Fig. 2.

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Fig. 3.

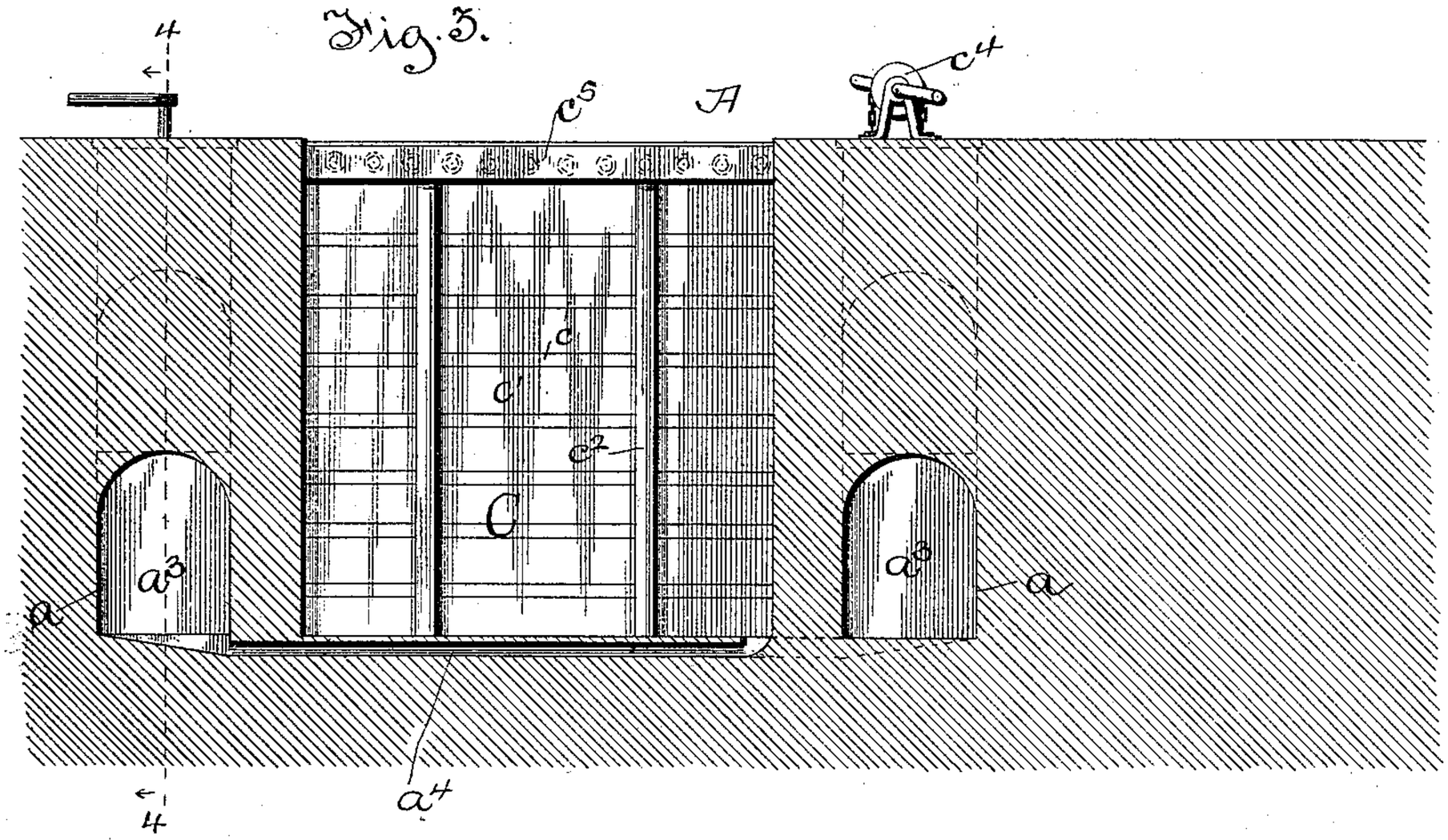
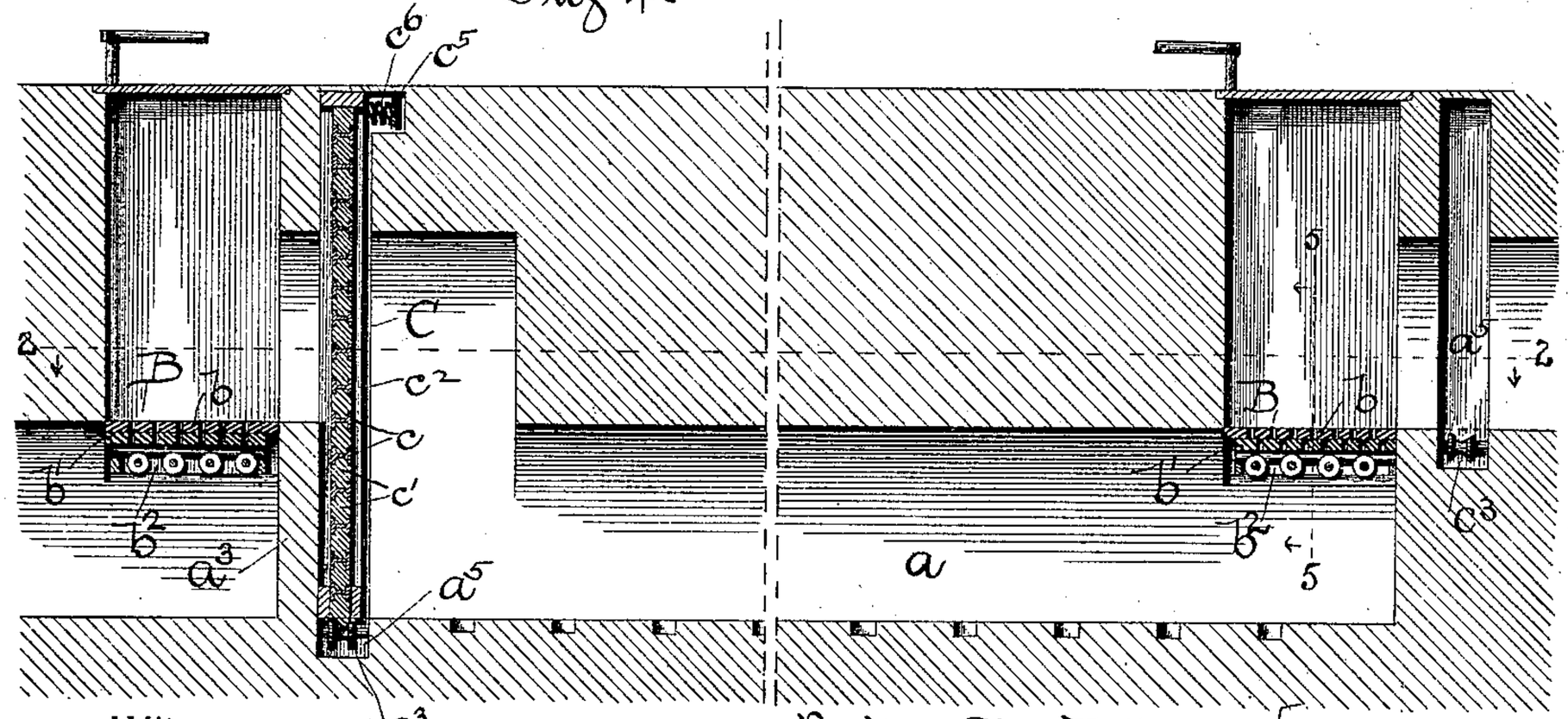


Fig. 4.



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UNITED STATES PATENT OFFICE.

EMILIEN ALFRED MANNY, OF BEAUHARNOIS, CANADA, ASSIGNOR TO DELIA ROCHETTE, OF SAME PLACE.

CANAL-LOCK.

SPECIFICATION forming part of Letters Patent No. 610,548, dated September 13, 1898.

Application filed October 21, 1897. Serial No. 655,953. (No model.)

To all whom it may concern:

Be it known that I, EMILIEN ALFRED MANNY, a citizen of the Dominion of Canada, residing at Beauharnois, in the county of Beauharnois, Province of Quebec, Canada, have invented certain new and useful Improvements in Canal-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in canal-locks.

The object of my invention is to provide a canal-lock in which the water will be passed into and out of the lock rapidly, but in such manner as will prevent the boat while occupying the lock from being rocked and moved about.

A further object is to provide a canal-lock in which the gates will be opened and closed after the water in the lock has reached the level to which the boat is intended to be passed.

A further object is to provide a gate for canal-locks which is strong and durable in construction and which can be easily operated.

A further object is to provide a valve for canal-locks which, while allowing the water to pass freely and rapidly from one side to the other, can be readily closed and when closed will prevent the passage of water regardless of the pressure against it.

A further object is to provide a canal-lock in which the entry of the water into the lock will be made in an evenly-distributed manner.

A further object is to provide a canal-lock which is durable in its construction and which will operate with ease, precision, rapidity, and absolute certainty.

My invention consists in the improved construction and combination of parts hereinafter described, and particularly pointed out in the claims.

In the drawings, in which similar letters of reference indicate similar parts in all of the views, Figure 1 is a perspective view showing a lock constructed in accordance with my invention, the upper gate being shown as closed and the lower gate being opened, the water in the lock being at the same height as that in the lower level. Fig. 2 is a horizontal sectional view taken on the line 2 2 of Fig. 4 and showing the upper gate closed, the lower gate open, the inlet-valves to the lock being in their closed position and the outlet-valves being in their open positions. Fig. 3 is a cross-sectional view taken on line 3 3 of Fig. 2. Fig. 4 is a longitudinal sectional view taken on line 4 4 of Fig. 3. Fig. 5 is an enlarged sectional view, taken on line 5 5 of Fig. 4, showing one of the valves and its operating-truck.

Canal-locks heretofore have been made very simple, consisting merely in the placing in the canal of two sets of gates the necessary distance apart, these gates being arranged to open in the center and swing to each side. While the cost of construction of such locks has been comparatively inexpensive, yet the many disadvantages which have arisen through their use have been so great as to cause the carrying of freight, &c., by canal to be greatly reduced. These disadvantages arise from the faulty principles of construction of the lock, which are as follows:

First. The length of time necessary to lock a boat from one level to another. This is caused by the fact that in locking up or down the inlet or discharge of the water into and out of the lock must be done very slowly in order that there may be no danger to the elementary construction of the lock or to the contents of the lock.

Second. The arrangement of the gates to swing from both sides with a circular movement, the opening for the passage of the water being in the center of the lock. This construction causes the water when being let into or out of the lock to be forced with a strong current through the lock, and should there be any boat in the lock at the time it would necessarily be rocked and pushed about by this current with great liability of strain and of wrecking some of its parts. Great care must also be taken in passing the boat out of the lock in going down the canal to prevent the suction of the water passing through the central opening from drawing the boat with it

and forcing the gates open, causing the boat to shoot out of the lock without the control of the boatman.

Third. The gates must be opened before the water can enter or pass out of the lock. This keeps the water in the lock in a continual state of turmoil.

To remedy these defects and provide a lock which will be of practical and commercial use, I have provided the following-described construction:

In the drawings, A designates a lock constructed in accordance with my invention. It is preferably constructed of stone masonry, although other material may be used, it being essential that the same be built in a thorough manner. The lock portion may be of any length, width, or depth, as the constructions disclosed will work as easily in a lock of great size as in a smaller one.

On both sides of the lock I construct tunnels or channels a a, having connection with the canal above the lock at a' and below the lock at a^2. The tunnels or channels a a are formed as shown in Fig. 4, being arranged so that the water passing therethrough will pass downward through valves placed in the path of its movements.

a^3 designates a wall formed transversely across the tunnel, by which the water to pass out is forced upward and out through the lower valve into the lower level of the canal.

B B designate valves placed in the tunnels or channels a a to regulate the passage of water to and from the lock. Said valves are of similar construction and consist of the upper or stationary perforated or slotted plate b, adapted to be secured by suitable means to the masonry, as shown in Fig. 5. Below the plate b is located a similar perforated or slotted plate b', its upper face being adapted to be held against the lower face of the plate b. The plate b' is of less length than the plate b and is adapted, by means of the truck b^2, on which it is mounted, to be moved in such manner that the perforations in the plates b b' will permit or prevent the passage of the water therethrough, as may be necessary. These valves being arranged on the principle of a "cut-off" valve, it is obvious that the plate b' may be moved from its operative to its inoperative positions with great ease, regardless of the pressure of the water above the plate b. The truck b^2 is composed of a framework, within which are mounted wheels adapted to revolve between suitable tracks located on the lower face of the plate b' and tracks mounted on the masonry, as best shown in Fig. 5. The lower plate b' may be operated by any suitable mechanism.

Connection between the tunnels a a and the lock A is had by means of transverse openings or channels a^4 a^4, preferably arranged as shown in Fig. 2. These openings are arranged in series and lead from alternate sides of the lock. The openings in each series are arranged so that the water from one of the tunnels will pass into the lock both on the side adjacent to the tunnel from which it comes and also on the opposite side of the lock. By this arrangement should the valve on either side refuse to operate the water would still enter the lock on both sides at points adjacent to the side, and the same effect would be produced when the water is let out of the lock. By means of this system of connecting the tunnels and the lock the water entering or leaving passes into and out of the lock at the sides of the bottom and away from the center. This causes a gradual raising or sinking of the boat, with no danger of its being drawn about the lock by any currents, the action of the water being either directly upward or downward, this action being equal on both sides of the lock and the action taking place at the extreme sides.

To better illustrate the action of the water in passing through the lock, I will state that the water enters the tunnels above the upper gate and passes downward and through the upper valve into the main portion of the tunnel. The lower valve being closed, the pressure of the water continuing to enter from the upper gate forces the water through the transverse openings a^4 into the lock, within which the water gradually rises until it reaches the height of the water in the upper level. When it is desired to lower the level of the water to that in the lower level, the upper valve is closed and the lower valve opened, when the water will pass out of the lock through the transverse openings or channels into the main portion of the tunnel, over the wall a^3, down through the lower valve, and out through the tunnel to the lower level. It will be noticed that this action of the water takes place regardless of the gates, excepting that when the lock is being filled or the water-level lowered the lower gate is kept closed. The upper gate could, as far as the raising or the lowering of the water in the lock is concerned, remain closed, it being necessary only to open it when it is desired to pass the boat from the lock to the upper level, or vice versa.

The amount of water which is passed into or out of the locks is regulated by the size of the perforations in the valves and the number of the transverse openings or channels, and as the water, owing to its manner of entering and leaving the lock, is prevented from making any currents or eddies it is apparent that the water may be admitted at an exceedingly-rapid rate with no danger to the lock itself or the boat contained therein.

By providing the foregoing construction to pass the water through the lock it is apparent that I am able to dispense with the usual form of gate, and thus eliminate one of the disadvantages accruing by its use—viz., the moving of each half of the gate in a circular manner against the resistance of the water. This also regulates the width of the lock, as the resistance offered to the movement of the common form of gate would be too great to allow

it to be operated except by some auxiliary power.

As the gates have no bearing on the admitting or discharge of water, as above shown, and as they are not operated until after the water in the lock has reached the level desired, it can be readily seen that I may employ the use of but one single gate instead of the two parts, as now commonly used, the gate being adapted to cross the canal at an angle to the direction of the flow of the water. By this means I am able to construct my gate of any size, the requirement being that it will sustain the water above it without danger of being sprung. The water both in the lock and in the level into which it is desired to lock the boat being of the same level, there would be an entire absence of resistance to the opening of the gate, which, being of comparatively narrow breadth, passes through the water with but slight friction. To obviate this friction, I make the ends of the gate angular, as shown in Fig. 2. Such being the advantages which accrue by the use of the gate shown, in order that a better understanding of the same may be had I describe my improved gate in detail, as follows:

C designates the gate, which is formed with alternate layers of iron bars *c* and suitable wood or packing *c'*, preferably made as shown in Fig. 4. Plates or bars c^2 are secured on both sides of the gate to strengthen it and keep it from any possible danger of vaporing. By this construction an exceedingly strong and substantial gate is formed.

To operate the gate C, I secure on its lower edge a suitable track which is adapted to rest on rollers c^3, secured in a transverse channel a^5 of the lock, as shown in Fig. 2. By mounting the gate in this manner I am able to move it backward and forward with a minimum amount of exertion on the part of the operator.

To readily move the gate backward and forward, I have provided a windlass c^4, on which I place chains or ropes extending downward through openings formed in the masonry, over suitable pulleys or sheaves, and into the transverse channel a^5, where they are adapted to rest on suitable rolls and be secured to the lower edge of the gate, at its front end. These ropes or chains are arranged in such manner that when turning the windlass in one direction the gate will be drawn forward and when reversed the gate will be drawn backward and thus open the lock, the ropes or chains being secured to the front end of the gate, one of the ropes or chains being connected directly to the gate, by means of which it is closed, while the other rope or chain is passed over a suitable pulley located below the gate, the end being attached to the gate, the second rope or chain serving to open the gate in an obvious manner.

While I have shown and described a windlass and chains as the means by which the gates are opened and closed, it is to be understood that I do not limit myself to this form, but may use any other means, the circumstances under which the lock is to be used and the gates operated controlling the form of operating means which are to be used.

On the gate, at the lower end of the lock, I secure, by suitable means, a bar c^5, extending entirely across the top and a short distance in front of the gate, between which and the bar I place powerful springs or buffers c^6. This construction is to prevent the boat, when passing into the lock from the upper level, from striking against the gate, especially where the boat comes into the lock under too great speed and it is found impossible to stop it before reaching the gate, the buffer being arranged to take up the jar occasioned by the striking of the boat.

The operation of the canal-lock as above constructed is thought to be clearly set forth in the above description, and it is not thought necessary to further describe it excepting to state that when it is desired to lock a boat through from the upper to the lower level, the water in the lock being at the same level as that in the lower level, the lower gate is closed, as are also the lower valves. The upper valves are then opened and the water in the lock is raised to the level of the water in the upper level. The upper gate is then opened and the boat passed into the lock. The upper valves and gate are then closed, the lower valves opened, and the water will pass out into the lower level. When the water has reached its lower position, the lower gate is opened and the boat passed out. When the boat is to be locked from the lower level to the upper level, the operation described is reversed.

By the above construction it will be possible to lock a boat from one level to the other in about four minutes of time, the question of time being regulated by the size of the valve-openings and the quantity of water that can be passed through the valves, it being obvious that as the amount or body of the water that is passed through the valves is increased the time necessary to raise and lower the water to its required level will be decreased.

The fact that when the gates are opened and closed the water is at rest, the pressure both above and below being the same, makes the gate easily operated and allows of the use of a lock of great size, the only additional power required to operate it being that required to move a heavier gate, and by the use of a steam-windlass the gate can easily and quickly be brought from one position to the other although the lock be of sufficient width to allow of the simultaneous passage of four or five boats. By constructing the gates with what are known as the "double-T" beams strength sufficient to hold the pressure of the body of water above the gate will be provided.

As shown in the drawings, and particularly in Fig. 2, a space is left above the gate which is intended as an escape for the water when

the gate is forced into the opening in which it rests when it is open for the passage of boats.

It is apparent that by placing the openings for the entrance and discharge of water to and from the lock on the bottom, adjacent to the sides, no current is formed, excepting, perhaps, an upward or downward movement of the water at the sides, which might form a slight movement; but this movement would necessarily be at the sides alone, thus leaving the central portion of the lock entirely free from any disturbance whatever and permitting the boat occupying the lock to rest in a central position during the entire movement of the water within the lock. In fact, any disturbance along the sides, where the disturbance is distributed equally on both sides of the lock, would tend to keep the boat in a central position.

It may be found necessary, owing to the conformation of the land through which the canal passes, to dispense with the tunnels or channels *a a*, in which case it is my intention to make a single or double tunnel through the center of the canal and having its entrance and inlet valves above the upper gate, while the discharge would be below the lower gate, the outlet-valves being located above or below the lower gate. Water would be admitted and discharged to and from the lock through the side openings, the openings being arranged as shown in the drawings, the difference in the construction being that of change of tunnels from one position to the other.

While I have thus described my invention in detail, I do not limit myself to such details of construction, but desire it to be understood that I claim the contruction broadly, and as such claim the use of all equivalents and the protection afforded by the courts for the use of such equivalents.

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

1. The combination with a canal; of auxiliary channels connected thereto; and connections between said channels and the lock portion of said canal, said connections being arranged to deliver water to and from said lock portion and on both sides thereof from said channels independently or collectively, substantially as described.

2. In a canal, the combination with gates adapted to inclose a portion of said canal; of channels connected with said canal but independent of said inclosed portion; means for connecting said channels and said inclosed portion, said connecting means being independent for each channel, said means also providing for the inlet and discharge of water to and from each of said channels to said inclosed portion on both sides thereof; valves for controlling the entrance of water to said channels; and valves for controlling the discharge of water from said channels, each valve being independent of the movement of the remaining valves.

3. In a canal, the combination with gates adapted to inclose a portion of said canal; of a channel connected with said canal but independent of said inclosed portion; and transverse channels connecting said independent channel and said inclosed portion, the openings of said transverse channels within said inclosed portion being arranged at opposite sides thereof, in such manner that water will be admitted to said inclosed portion at both sides simultaneously.

4. In a canal, the combination with gates adapted to inclose a portion of said canal; of channels connected with said canal but independent of said inclosed portion; and means for admitting water to said inclosed portion from each of said channels simultaneously at opposite sides of said inclosed portion.

5. A canal-lock, comprising a series of gates located in said canal; auxiliary channels connected to said canal; a series of channels connecting each auxiliary channel and said portion between the gates, each series having its openings in said portion, arranged at opposite sides of the bottom thereof.

6. A valve for canal-locks, comprising a plate having perforations secured to said lock; a plate having similar perforations adapted to be movable against one side of said stationary plate; a truck arranged to support said movable plate; and means for moving said truck.

7. The combination with a canal; of auxiliary channels connected thereto; controllable ports to and from said channels, whereby said channels may be used independently or collectively; and connections between said channels and the lock portion of said canal, said connections from each channel being arranged to deliver water to and from said lock portion and on both sides thereof, whereby water will be admitted on both sides of said lock portion from either or both of said channels, substantially as described.

8. A gate for canal-locks, comprising a series of bars having great tensile strength interposed between layers of less tensile strength; and bars secured to the sides of said bars and said layers, in a direction at right angles to said bars and layers.

9. The combination with a canal having a lock portion; of an auxiliary channel having connection with said canal and said lock portion; and independently-operated valves located in said channel on a plane above the bottom of said lock portion, whereby said lock portion cannot be entirely emptied through the medium of said channel, substantially as described.

10. The combination with a canal; of an auxiliary channel connected therewith; a lock portion formed in said canal contiguous to said channel; and transverse channels connecting said channel and said lock portion, said channels having their openings in said lock portion arranged alternately on opposite sides of said portion, substantially as described.

11. The combination with a canal-gate; of a bar located in front of and extending entirely across said gate; and yielding buffers secured between said bar and said gate, substantially as described.

12. The combination with a canal-gate; of a bar located in front of and extending entirely across said gate; and a series of spring-buffers secured between said gate and said bar, substantially as described.

13. The combination with a canal; of auxiliary channels connected therewith; controllable ports, independently operated, between said canal and said channels; a lock portion formed in said canal contiguous to said channels; and transverse channels leading independently from each of said channels to said lock portion, each alternate transverse channel leading from the same channel, having its opening in said lock portion arranged on the same side of said portion, the remaining channels having their openings on the opposite side of said portion, substantially as described.

14. The combination with a canal; of auxiliary channels connected therewith; controllable ports, independently operated, between said canal and said channels; a lock portion formed in said canal contiguous to said channels; and a series of transverse channels connecting each of said channels to said lock portion, each series of channels leading from the same auxiliary channel, having their openings in said lock portion arranged alternately on opposite sides of said portion, whereby water will be admitted to said lock portion at both sides thereof regardless of the number of auxiliary channels used, substantially as described.

15. The combination with a canal having a lock portion; of a series of auxiliary channels having connection with said canal and said lock portion; and independently-operated valves located in each of said channels, each of said valves being located on a plane above the bottom of said lock portion, said valves being located on the same plane, whereby the water will be passed downward through said valves, and said lock portion will be prevented from becoming entirely empty through the medium of said channels, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EMILIEN ALFRED MANNY.

Witnesses:

J. A. MARION,

HORACE G. SEITZ.