Oct. 6, 1925.

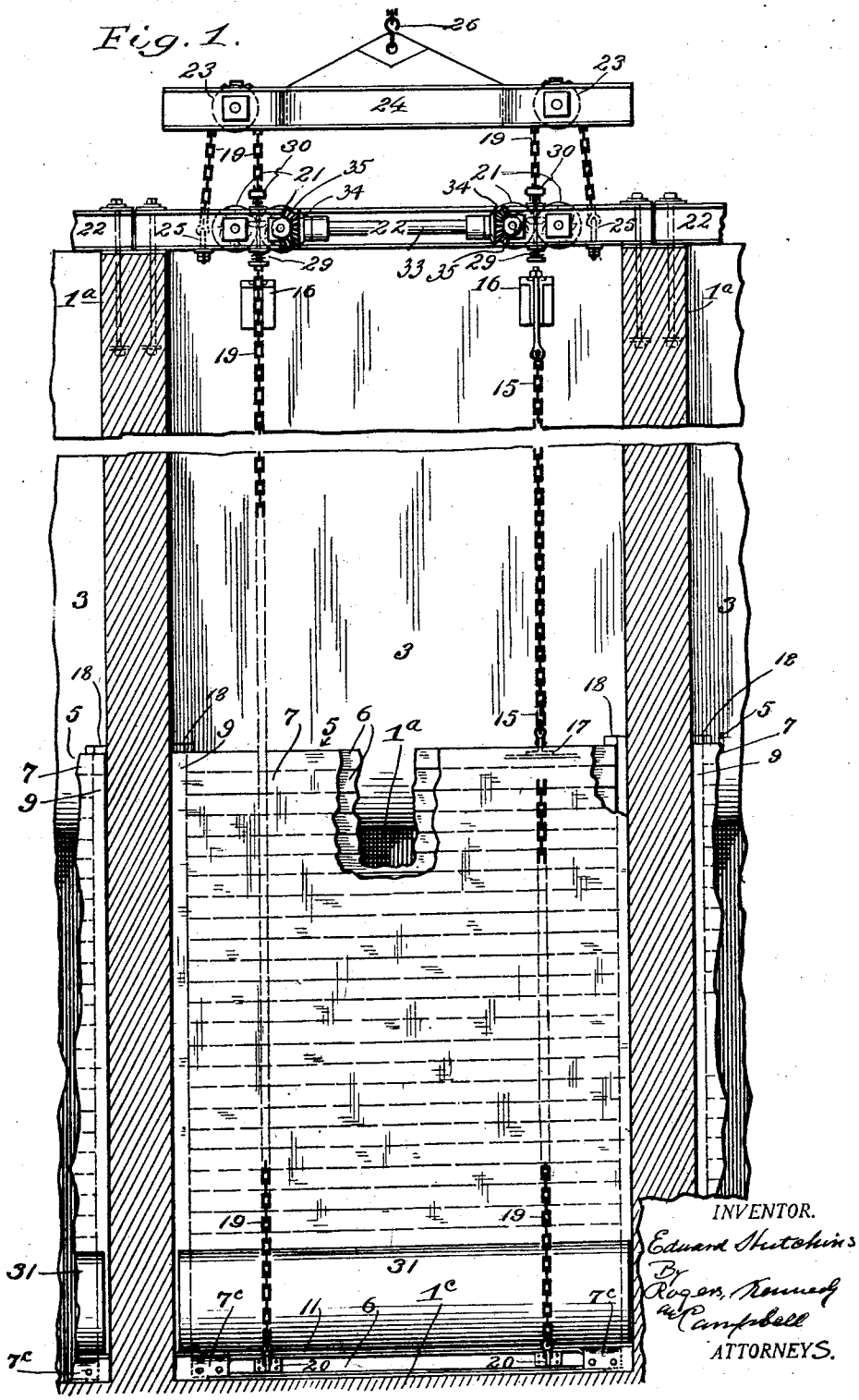
1,556,328

E. HUTCHINS

WATER GATE

Filed Jan. 25, 1924 4 Sheets-Sheet 1

Fig. 1.




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Fig. 2.

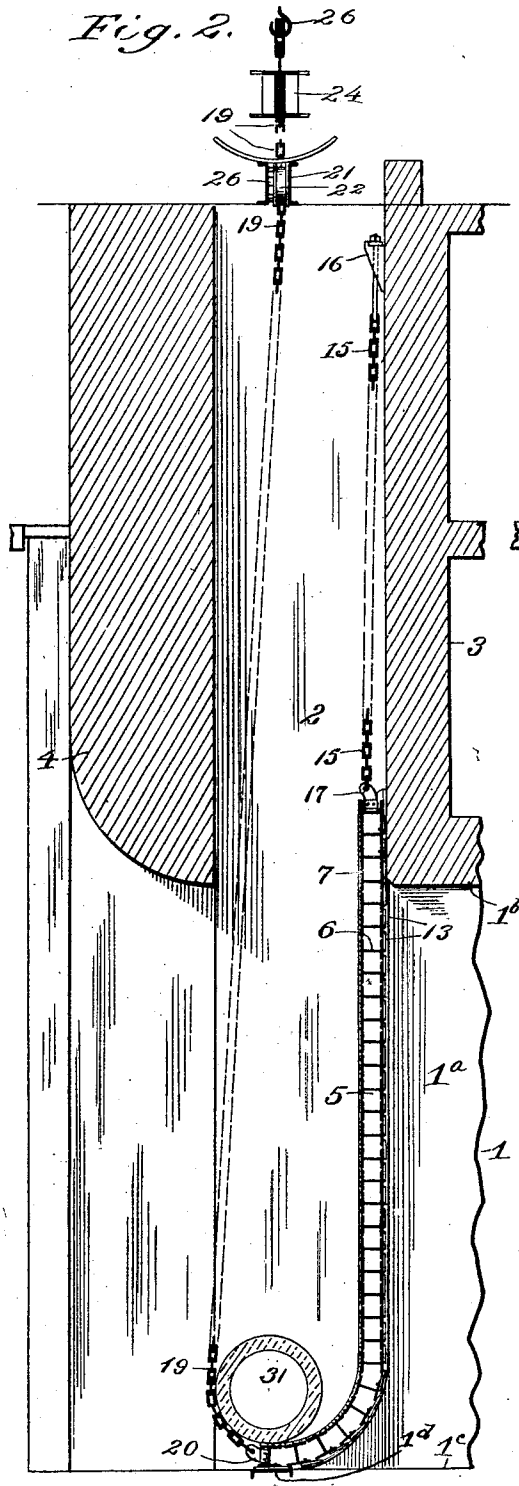
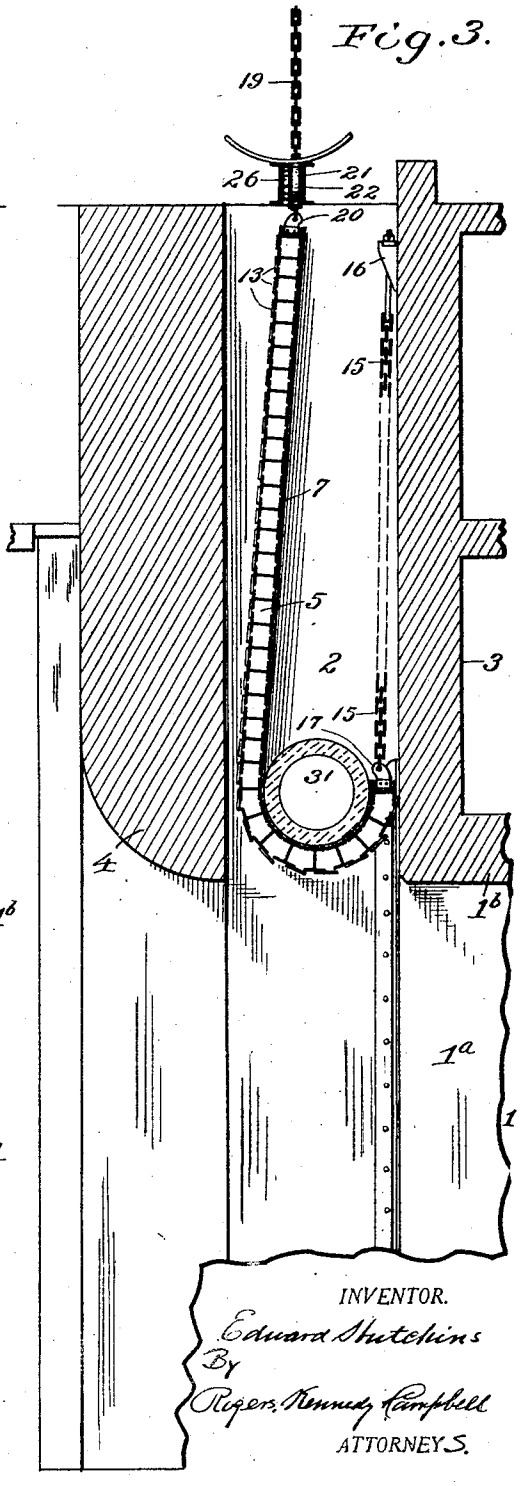



Fig. 3.




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WATER GATE

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Fig. 4.

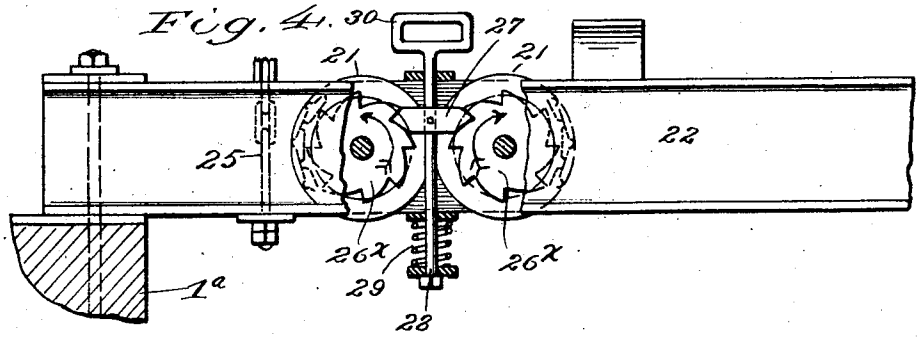



Fig. 5.

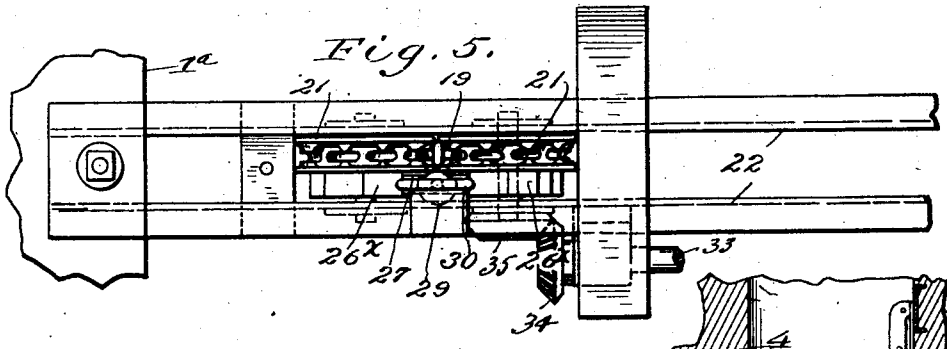



Fig. 9.

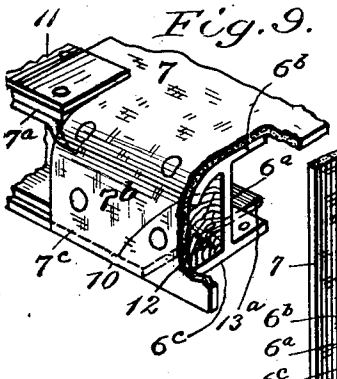



Fig. 8.

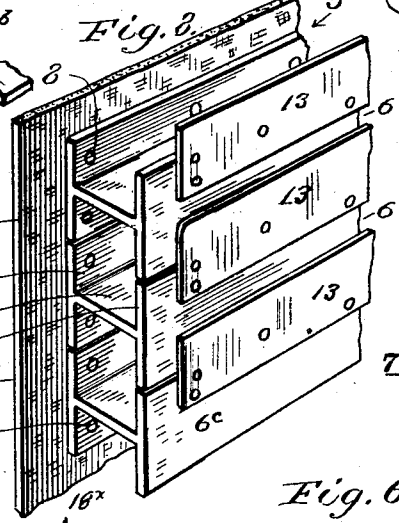



Fig. 7.

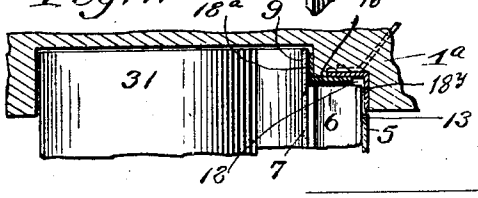
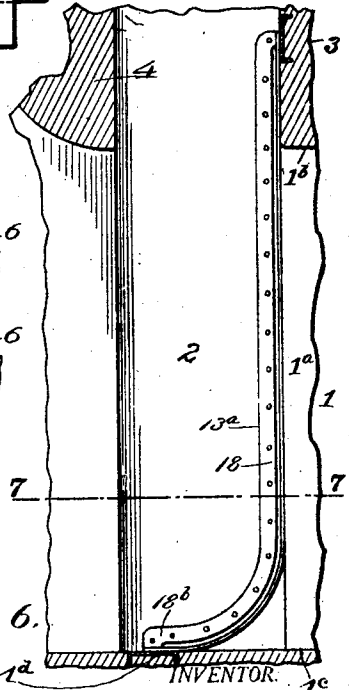



Fig. 6.




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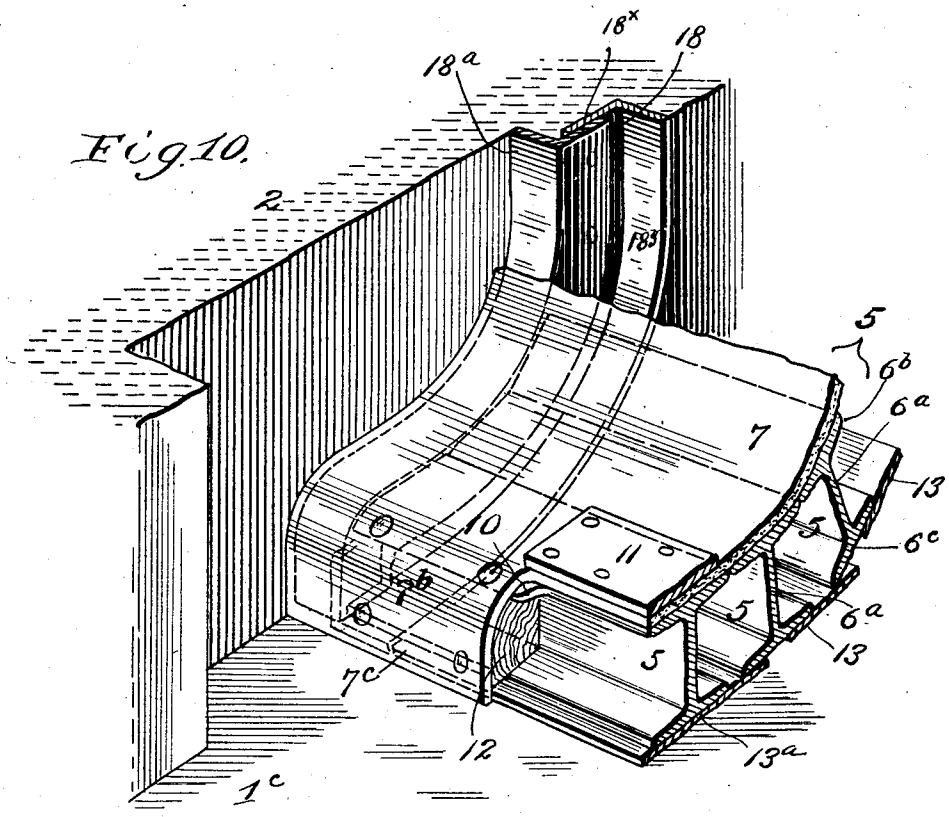
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WATER GATE

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Fig. 10.




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Patented Oct. 6, 1925.

1,556,328

# UNITED STATES PATENT OFFICE.

EDWARD HUTCHINS, OF NEW YORK, N. Y., ASSIGNOR TO INTERNATIONAL PAPER COMPANY, A CORPORATION OF NEW YORK.

## WATER GATE.

Application filed January 25, 1924. Serial No. 688,362.

*To all whom it may concern:*

Be it known that I, EDWARD HUTCHINS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Water Gates, of which the following is a specification.

This invention relates to water gates and has reference more particularly to the type of gate which is flexible and which is supported so that it will extend across the water-conducting sluiceway or passage, and is adapted at its lower end to be raised or lowered with a rolling or folding action to open or close the passage more or less, and thus control the flow of water therethrough.

The present invention is directed to an improved form of such gate and to the manner of mounting and operating the same, whereby a strong and durable construction is produced, and one capable of being operated with facility and effectiveness in attaining the objects in view; and the invention consists of the improved construction and arrangement of parts which will be fully described in the specification to follow and the novel features of which will be set forth in the appended claims.

In the accompanying drawings:

Fig. 1 is a front elevation of a water gate having my invention embodied therein, the same being shown in lowered closed position.

Fig. 2 is a vertical sectional elevation of the same.

Fig. 3 is a view similar to Fig. 2, but with the gate in raised open position.

Fig. 4 is a sectional elevation, on an enlarged scale, of a detail for guiding and controlling the gate operating chains.

Fig. 5 is a top plan view of the same.

Fig. 6 is an elevation of the inner side of one of the walls of the water conducting passage or sluice, showing how the same is formed to receive and guide the ends of the gate.

Fig. 7 is a horizontal sectional plan view, on an enlarged scale, on the line 7—7 of Fig. 6.

Fig. 8 is a fragmentary perspective view on an enlarged scale of a portion of the gate, showing the detailed construction of the same.

Fig. 9 is a fragmentary perspective view of the lower end corner of the gate showing how the parts are connected together.

Fig. 10 is a perspective view of the lower end of one of the gate guiding channels and the lower end of the gate at one side in said channel.

Referring to the drawings:

Referring particularly to Figs. 1, 2 and 3, 1 designates a sluice or passage through which the water flow is to be controlled, which passage is bounded on its sides by side walls $1^a$, $1^a$, and on its top and bottom by a top wall $1^b$ and a bottom wall $1^c$, a vertical channel or chamber 2 being formed between vertical walls 3 and 4 extending upwardly from the top of the passage, the purpose of which channel will presently appear.

5 designates my improved water gate comprising a water impervious flexible structure, which for convenience of description I term a "gate apron", the upper end of which is supported at the front of the upper wall of the passage at the lower end of channel 2 so that the apron will hang down in front of the passage and close the same as shown in Fig. 2, and may have its lower end lifted and drawn up in the channel 2 to open the passage as shown in Fig. 3.

The gate apron is preferably of the detailed form and construction best shown in Figs. 1, 2, 3 and 8, where it will be seen that it consists of a series of horizontal bars or elongated sections 6, in the present instance in the form of H beams arranged closely side by side, with the webs $6^a$ parallel to each other, and the flanges $6^b$ and $6^c$ at the ends of the webs disposed edge to edge in two parallel rows or sets. A stout flexible sheet 7 of rubber or other suitable material impervious to water, is firmly fastened to the front flanges $6^b$ of the assembled beams by suitable means, as for instance by rivets 8, thereby connecting the beams flexibly together and forming in effect a flexible sheet-like impervious structure or apron. The rubber sheet is somewhat wider than the width of the assembled beams, so that the sheet will project at its side edges some distance beyond the ends of the beams as at 9, as best seen in Fig. 8, the purpose of which will presently appear.

The end of the rubber sheet is fastened to the lowermost beam of the series in such

manner that when the gate is in lowered closed position with the lowermost beam resting on the lower wall $1^c$ of the passage as shown in Fig. 2, the passage will be effectually sealed against the flow of water. This is effected in the present instance by bending the ends of the flanges of the lowermost beam inwardly toward the web as shown at 10 in Fig. 9. The end of sheet 7 is cut to form a central recess $7^a$ and two projecting tongues $7^b$ at the ends of the recess, and the recessed end of the sheet is seated against the straight portion of the flange and fastened firmly thereto by means of a clamping plate 11 riveted down on the end of the sheet and the underlying flange. The two projecting tongues $7^b$ of the sheet are turned down over the bent end portions of the flange, and are riveted thereto, and are riveted also to filler blocks 12 which are driven tightly into the spaces at the ends of the beam between the bent flange ends and the rear flange $6^c$, the ends of the tongues $7^b$ extending down a short distance beyond the rear flange 13 of the beam so as to overlap said flange as best seen in Figs. 9 and 10.

The joints between the rear flanges $6^c$ of the beams are closed to prevent the entrance of foreign matter by flaps or plates 13 which may be of rubber or other suitable material, a flap or plate being fastened to the flange of each beam adjacent the edge of said flange, and extending across the joint and overlapping the flange of the next adjacent beam, these flaps terminating at their ends some distance inward of the ends of the beams as shown in Fig. 8. The flap $13^a$ of the lowermost beam is extended as shown in Figs. 9 and 10 so as to project forwardly beyond the flange of the beam and abuts at its edge against the inner faces of the tongues $7^b$. As a result of this arrangement, when the gate is in closed position as shown in Fig. 2, the flap of the lowermost beam will rest upon a channel plate $1^d$ extending transversely in the bottom wall $1^c$ of the passage and will thus effectually prevent the water from passing between the lower end of the gate and the bottom wall. Also in this position of the gate, the tongues $7^b$ at the ends of the gate will rest at their lower edges upon the lower wall of the passage and will effectually prevent the passage of water between the gate and the lower wall at these points, while the filler blocks 12 at the ends of the lowermost beam will effectually prevent the passage of water around the ends of the gate.

The gate apron is fastened in place so as to hang down in front of the passage 1, in the present instance by means of two suspending chains or cables 15, 15, the upper ends of which are anchored to brackets 16, 16, fixed to the wall 3 in channel 2 near its upper end. At the lower ends the chains are attached to brackets 17, 17 fastened to the web of the uppermost beam of the apron, the length of the chains being such that this beam, and consequently the upper end of the apron, will be supported within the channel 2 just above the top of the passage or sluice 1. From this point the apron, as shown in Fig. 2, hangs down in front of the passage 1 and completely closes the same against the passage of water therethrough. In this position of the apron, the ends of the H beams extend and are guided in guide channels 18, 18 formed in the side walls $1^a$ and constituted by the longitudinal surfaces $18^x$ and the transverse surfaces $18^y$, while the sheet 7 projects at its ends beyond the guide channels and seats against the transverse ledges $18^a$, $18^a$ at the sides of the channels. The ends of the beams fit in and extend between the two longitudinal surfaces $18^x$ of the guide channels, and the exposed ends of the flanges of the beams where they extend beyond the ends of the flaps 13, bear against the transverse surfaces $18^y$ of the guide channels as shown in Fig. 7. At their lower ends the guide channels curve forwardly as at $18^b$, $18^b$, see Figs. 1 and 6, and the lower portion of the apron follows this forward curvature, and the lowermost beam of the apron rests on the bottom wall $1^c$ of the passage on the channel plate $1^d$ as before described. From this point the lower end of the apron is adapted to be lifted in order to raise the apron and thus open the passage, and in the present instance this is effected by means of two apron lifting chains 19, 19 whose lower ends are fastened to bracket plates 20, 20 secured to the web of the lowermost beam of the series, whence the chains extend upwardly between pairs of idler sprocket wheels 21, 21 journaled on an elevated fixed support in the form of a beam 22 supported by the side walls $1^a$, and thence over guides in the form of idler sprocket wheels 23, 23 journaled on a vertically movable member in the form of a bridle beam 24, and finally down again to the beam 22 to which the ends of the chains are anchored as at 25, 25. From this construction and arrangement of the parts, it will be understood that when the bridle beam is lifted, which may be effected by the attachment of suitable lifting power means thereto by the coupling hook 26, the chains 19 will be drawn upwardly and will pull the lower end of the apron upwardly, which due to its flexible character, will fold on itself and be lifted with a rolling motion and will be carried upwardly into the channel 2 as shown in Fig. 3.

In this action of the parts the lifting chains will travel between the idler sprocket wheels 21 and the wheels will be positively rotated, and on the arrest of the rotary motion of the wheels, the chains will be held from movement. In order therefore to con-

trol the motion of the wheels so that the apron may be held in different positions to open the passage more or less, ratchet wheels 26ˣ are fixed to the sprocket wheels, and a locking dog 27 is provided which has its ends formed to be engaged by the teeth of the two ratchet wheels. This locking dog is carried by a rod 28 mounted in guides in the beam 22 and is capable of slight endwise movement, and is acted on by a spring 29 tending to hold the rod with the locking dog in yielding locking engagement with the ratchet teeth, and preventing the ratchet wheels from turning in a direction to permit the chains to descend, but allowing the ratchet wheels, and consequently the sprocket wheels, to turn when the chains are lifted. At its upper end the rod is provided with a handle 30 by which the operator can raise the rod against the force of the spring and thereby disengage the locking dog from the ratchet wheels when the gate is to be lowered.

In the operation of this mechanism, as the chains are pulled upwardly by the elevation of the bridle beam, the sprocket wheels will be rotated, and the ratchet wheels will be likewise rotated in the direction of the arrows in Fig. 4, with their teeth clicking past the locking dog. When the desired elevation of the apron has been attained, the lifting power is shut off and the apron will be held in the position lifted by the locking dog. When it is desired to lower the apron from its raised position, the operator grasps the handle 30 and pulls the rod upwardly and thereby disengages the locking dog from the ratchet wheels, whereupon the weight of the parts of the apron will cause the same to descend, with the idler sprocket wheels rotating freely.

The idler sprocket wheels in connection with the ratchet wheels and locking dogs, form in effect locking mechanisms for the lifting chains, permitting the chains to ascend, but arresting their descent, the said locking mechanisms being releasable, so that the chains may be permitted to descend, when the apron is to be lowered.

In order to steady the apron in its raising and lowering actions, and insure a uniform folding and support of the same so as to prevent the beams of the apron from bending too sharply on themselves and thereby creasing or breaking the sheet; and further, in order to insure a quick and instant descent of the apron when the lifting power is shut off and the apron is released, I provide a gravitating member, in the present instance in the form of a roll 31 which rests loosely in the fold of the apron and is confined between the same and the lifting chains 19 when the apron is in its lowered closed position as shown in Fig. 2. This roll will, when the lifting chains are operated to raise the apron, be carried upward with the same and will gravitate and rest loosely in the fold made by the apron in the jointing of the H beams on each other, and in this way will act to steady the movements of the apron in its raising and lowering action, and will insure a uniform and positive operation of the parts without danger of buckling or bending too sharply.

In order that in the raising and lowering movements of the apron by the chains 19, the end of the apron will be maintained in a truly horizontal position and the apron will roll up evenly, I propose to gear one of the idler sprocket wheels of one pair to one of the idler sprocket wheels of the other pair, so that the wheels of the two pairs will be rotated in unison in the travel of the chains between them. This in the present instance is effected by a horizontal connecting shaft 33 which is mounted in bearings on the fixed beam 22. This shaft has fixed to its ends bevel pinions 34 and 35 which mesh respectively with bevel pinions 36 and 37 on the inner sprocket wheels of the two pairs, whereby these wheels will be caused to rotate synchronously, and due to the engagement of the chains with the said wheels and with the other wheels of the pairs, all of the wheels will rotate together at the same speed, and one chain will be prevented from moving faster or in relation to the other chain, and thereby the horizontal position of the end of the apron supported by the chains will be preserved.

Having thus described my invention, what I claim is:

1. A water gate comprising in combination, a plurality of sections lying side by side, and a flexible water-impervious sheet attached to each of said sections and covering the same and connecting them together in the form of a flexible apron.

2. A water gate comprising in combination, a plurality of sections lying side by side, and a flexible sheet attached to each of said sections and covering the same and connecting them together in the form of a flexible apron, said apron being adapted to be suspended at one end so as to hang down across a water passage to close the same, and adapted at its other end to be elevated and thereby folded on itself to open the passage.

3. A water gate comprising in combination, a plurality of flanged sections lying side by side, and a flexible sheet attached to the flanges of each of said sections and covering the same and connecting the sections together in the form of a flexible apron.

4. A water gate comprising in combination, a plurality of flanged beams lying side by side with the flanges of the beams disposed edge to edge in two sets, and a

flexible sheet attached to each of the flanges of one set and covering the same and connecting the beams together in the form of a flexible apron.

5. A water gate comprising in combination, a plurality of sections lying side by side, a flexible sheet attached to one side of said sections and connecting them together in the form of a flexible apron, and flaps attached to the other sides of the sections and extending across the joints between the sections to exclude foreign matter.

6. A water gate comprising in combination, a plurality of flanged beams lying side by side with the flanges of the beams disposed edge to edge in two sets, a flexible sheet attached to the flanges of one set and connecting the beams together in the form of a flexible apron, and flaps attached to the flanges of the other set and extending across the joints between said flanges.

7. A water gate comprising in combination, a plurality of H beams lying side by side with the flanges of the beams disposed edge to edge in two sets, a flexible sheet attached to the flanges of one set and connecting the beams together in the form of a flexible apron, and a flap fastened to each of the flanges of the other set and overlapping the flange of the next adjacent beam.

8. A water gate comprising in combination, a plurality of sections lying side by side, a flexible sheet attached to the sections and connecting them together in the form of a flexible apron, and a clamping plate applied to the terminal section of the series over the end of the sheet thereon and serving to confine the end of the sheet on said section.

9. A water gate comprising in combination, a plurality of flanged sections lying side by side, filler blocks inserted between the flanges of the lowermost section at the ends of the same, and a flexible sheet attached to the flanges of the sections and connecting the latter together flexibly, said sheet being fastened at its outer end portions to the filler blocks.

10. A water gate comprising in combination, a plurality of flanged sections lying side by side, filler blocks inserted between the flanges of the lowermost section at the ends of the same, a flexible sheet attached to the flanges of the sections and connecting the sections together flexibly, and a clamping plate applied over the central portion of the sheet and fastened down on the flange of the lowermost section, the end portions of the sheet being fastened down on the filler blocks.

11. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, means for lifting the lower end of the apron and thereby causing the apron to fold on itself and open the passage, and a gravitating member independent of the lifting means and lying loosely in the fold of the apron.

12. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, means for lifting the lower end of the apron and thereby causing the apron to fold on itself and open the passage, and a gravitating roll independent of the lifting means and lying loosely in the fold of the apron.

13. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, a lifting chain attached to the lower end of the apron and extending upwardly, a locking mechanism engaging the chain and acting automatically to permit its upward movement while locking it against downward movement, means for releasing the locking mechanism to permit the chain independently of the locking means to descend, and means acting on the chain for raising the same.

14. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, a lifting chain attached to the lower end of the apron and extending upwardly therefrom, idler wheels between which the chain passes and are rotated by the rise of the chain, ratchet wheels on said idler wheels, a spring actuated locking dog engaging the ratchet wheels, and means acting on the chain for raising the same.

15. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, two lifting chains attached at their lower ends to the lower end of the apron and extending upwardly therefrom and anchored at their upper ends on a fixed support, a vertically movable member above the fixed support, and guides on said member over which the chains pass.

16. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, two lifting chains attached at their lower ends to the lower end of the apron and extending upwardly therefrom, a fixed elevated support to which the upper ends of the chains are anchored, releasable locking mechanisms on said fixed support engaging the chains and locking the same against descent while permitting their ascent, said

mechanisms being releasable to free the chains and permit them to descend, a vertically movable member above the elevated support, and guides on said member over which the chains pass.

17. In combination with a water conducting passage provided with side walls, said side walls being provided with upright guide channels and with upright ledges at the outer sides of the channels, a flexible water gate apron comprising a plurality of sections and a flexible sheet attached to said sections and extending at its edges beyond the ends of the sections, said sections being adapted to extend at their ends in and be guided by said guide channels, and the projecting ends of the sheet being adapted to seat against the said ledges, means for supporting the upper end of the apron above the passage so that the same will hang down across the passage, and means for lifting the lower end of the apron to fold the same on itself and open the passage.

18. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, two lifting chains attached to the lower end of the apron and movable upwardly to raise the apron, and means acting on the chains and operating to cause them to move in synchronism.

19. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above the passage and adapted to hang down across the same, two lifting chains attached to the lower end of the apron and movable upwardly to raise the apron, idler sprocket wheels engaged by and guiding the chains, and gearing connecting said sprocket wheels to cause them to move in synchronism.

20. In combination with a water conducting passage, a flexible water gate apron supported at its upper end above said passage and adapted to hang down across the same, two lifting chains attached at their lower ends to the lower end of the apron and extending upwardly therefrom, a fixed elevated support to which the upper ends of the chains are anchored, means on the fixed support adapted to engage the chains and lock the same against descent and operable to release the chains to permit their descent, a vertically movable member above the elevated support, and guides on said member over which the chains pass.

In testimony whereof, I have affixed my signature hereto.

EDWARD HUTCHINS.