

No. 862,673.

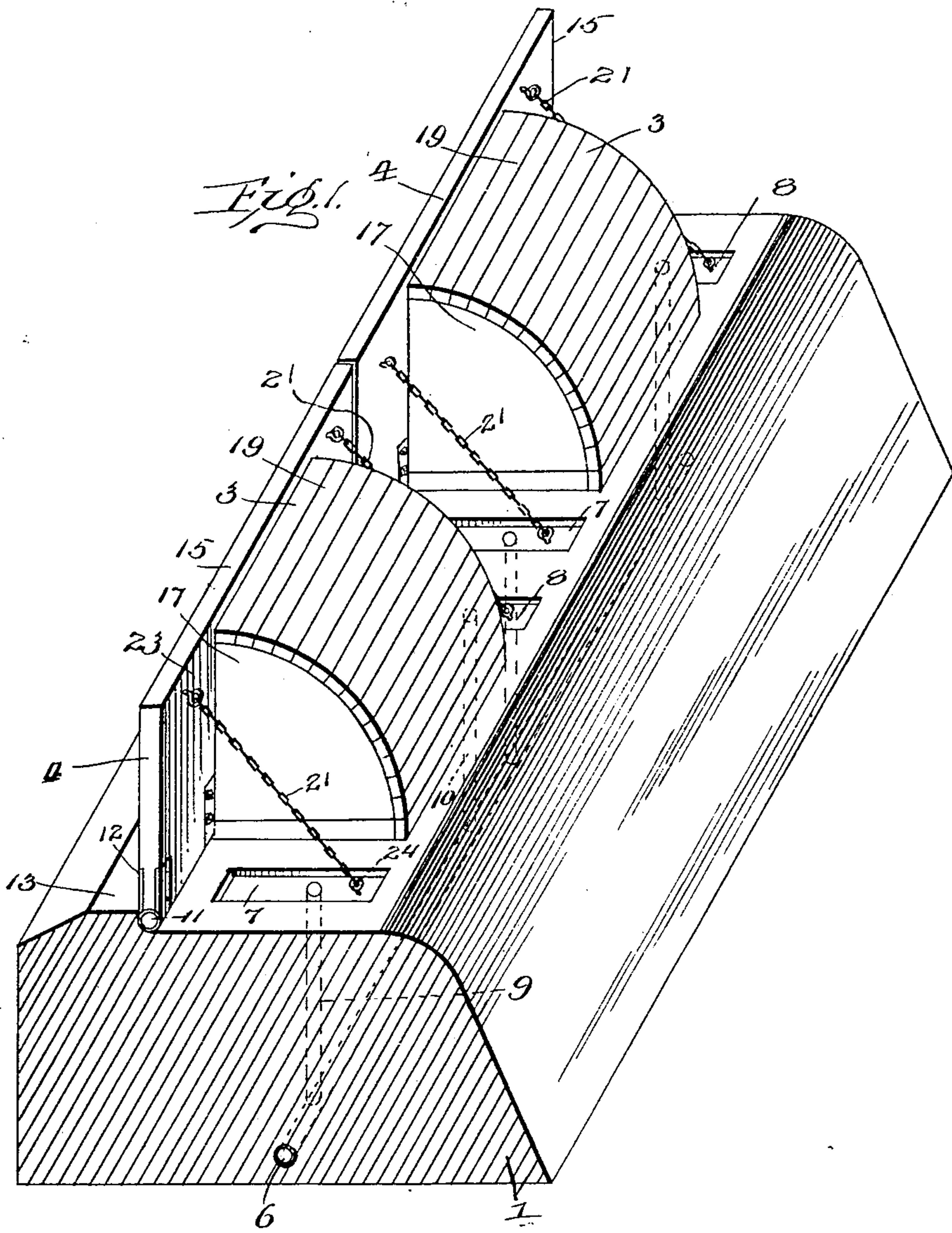
PATENTED AUG. 6, 1907.

G. F. STICKNEY.

AUTOMATIC MOVABLE CREST FOR DAMS.

APPLICATION FILED JAN. 8, 1907.

2 SHEETS--SHEET 1.



Inventor

George F. Stickney

Witnesses

Witnesses
J. M. Fowler Jr
W. L. Kitchen.

33
Mason, Fenwick & Lawrence
his Attorneys

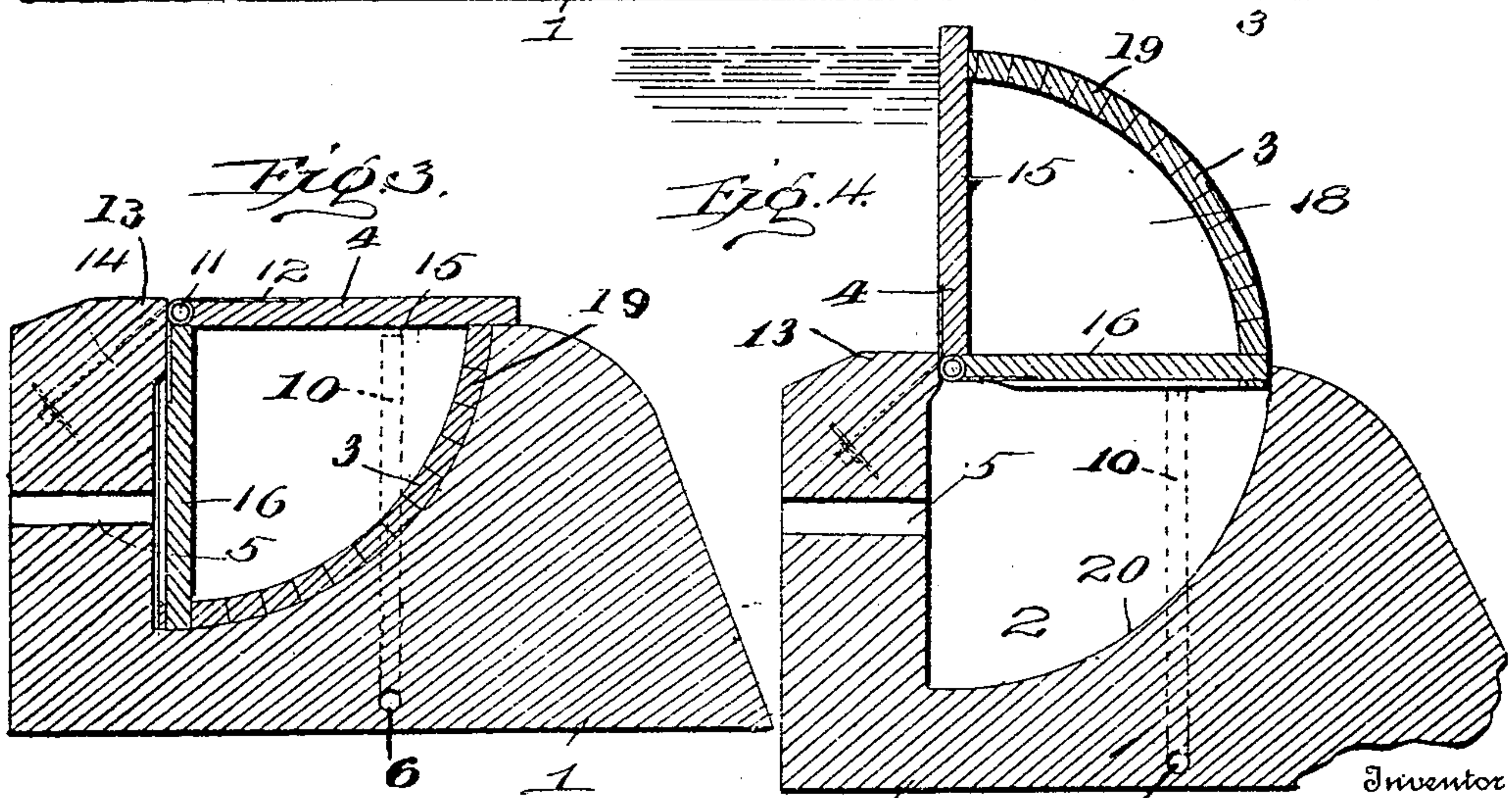
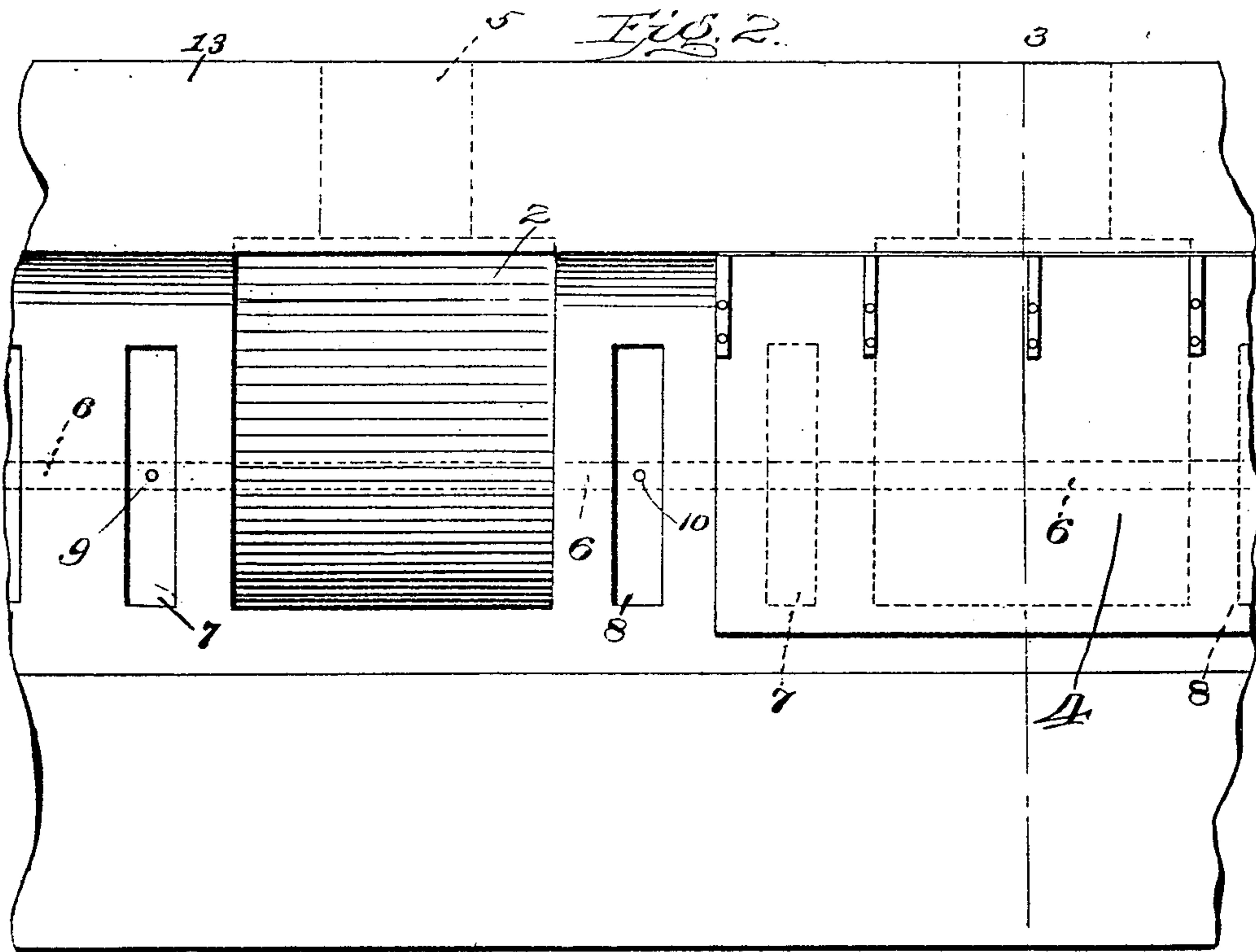
No. 862,673.

PATENTED AUG. 6, 1907.

G. F. STICKNEY.
AUTOMATIC MOVABLE CREST FOR DAMS.

APPLICATION FILED JAN. 8, 1907.

2 SHEETS—SHEET 2.



Witnesses

Witnesses
M. Fowler Jr
A. L. Kitchen

Inventor

1 George ⁶F Stickney

334 Mason, Fenwick & Lawrence
his Attorneys

UNITED STATES PATENT OFFICE.

GEORGE F. STICKNEY, OF ALBANY, NEW YORK.

AUTOMATIC MOVABLE CREST FOR DAMS.

No. 862,673.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed January 8, 1907. Serial No. 351,386.

To all whom it may concern:

Be it known that I, GEORGE F. STICKNEY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain
5 new and useful Improvements in Automatic Movable Crests for Dams; 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.

10 This invention relates to improvements in dams, and particularly to dams provided with crests.

The invention comprises the production of a stationary portion and a movable portion pivotally secured to said stationary portion, and adapted to act in con-
15 junction therewith for regulating the height of water surfaces during various seasons of the year.

The invention further comprises the production of a stationary member in which a chamber is formed and a movable member pivotally secured to the stationary
20 portion and provided with a chamber that is adapted to move in the chamber formed in the stationary portion.

The invention still further comprises the production of a stationary portion of any desirable material, and
25 a movable portion pivotally secured thereto that is adapted to move automatically as water rises and falls in the streams that is being dammed.

The object in view is the production of a dam having a crest that is adapted to be operated automatically by
30 the pressure of water that is being dammed.

Another object in view is the production of a dam having a movable crest that will automatically raise and stay in a raised position while the flow of the stream is normal and that will automatically fall and remain
35 down while the flow of the stream is above the normal, or in times of flood.

A further object in view is the production of a dam which will raise the water surface and impound the water of streams, during the normal condition of flow,
40 without materially increasing the flood height of the stream, thus avoiding the overflow of adjacent lands in times of flood.

With these and other objects in view the invention comprises certain novel constructions, combinations
45 and arrangements of parts as will be hereinafter more fully described and claimed.

In the accompanying drawings:—Figure 1 represents an isometric view of a portion of a dam having movable crests secured thereto, constructed according to the
50 present invention. Fig. 2 is a top plan fragmentary view of a dam constructed according to the present invention, one of the crests being removed to better disclose the interior of the dam. Fig. 3 is a cross sectional view of Fig. 2 on line 3—3, the crest being shown in its
55 lowered position. Fig. 4 is a view similar to Fig. 3, the crest being shown in its extreme upper position.

In the construction of dams it has been customary to provide various means for increasing temporarily the height of the same, or under certain circumstances to increase permanently the height of the same, but with
60 a weaker construction than the main portion of the dam. It has also been found desirable in many instances to provide an increased height to the dam by the provision of what is known as crest, either of a stationary variety or a movable variety. In the produc-
65 tion of crests of the movable kind, various mechanism have been provided for raising and lowering the crest to accommodate the various height to which the water is brought and various other circumstances as occasion may require. 70

It is to the class of movable crests that the present invention relates, and particularly to crests that have no auxiliary means for moving the same.

Referring more particularly to the drawings, 1 indicates the stationary part of a dam formed according to
75 the present invention. The stationary or fixed portion 1 is provided with a hollowed-out or recess chamber 2, and is adapted to receive a parti-cylindrical portion 3 of the crest 4 to be more fully hereinafter described. The recess or pressure chamber 2 is in free communica-
80 tion with the up-stream side of the dam by an opening or passageway 5 of any desired size, preferably located a little ways below the top of the fixed portion of the dam. By providing the opening 5, chamber 2 will be
85 always supplied with water under pressure, due to the level of the water on the up-stream side, and as the water increases in depth the pressure of the water in the chamber will be correspondingly increased for action upon the crest 4. Positioned at any suitable
90 place in the stationary part 1 of the dam is an air pipe 6 which is adapted to furnish air to depressions 7 and 8 in the portion 1 by means of suitable connecting pipes 9 and 10 as will be clearly seen in Fig. 1.

The upper portion 13 of the stationary part 1 is slightly higher than the lower part so that when the
95 crest 4 is down the water can freely flow over the crest. The movable portion or crest 4 of the dam is pivotally secured to the stationary or fixed portion 1, by means of suitable bands or hinges as 12, around a shaft 11. The horizontally positioned shaft or axle 11 is prefer-
100 ably positioned just back of the upper portion 13 of the stationary part of the dam as clearly seen in Fig. 1. The axle or shaft 11 is held in place preferably by anchors as 14 embedded in the stationary part 1 of the dam, to which the bands or hinges 12 are attached. 105
Secured to the shaft 11 is a preferably rectangular surface as 15 and a preferably rectangular shaped surface 16, the same radiating from the shaft 11 and held at any desired angle with respect to each other by sector shaped pieces 17 and 18. As shown the angle of the
110 rectangular pieces 15 and 16 is 90° but it is desired to be understood that any other angle that may be desired

may be used or the surfaces 15 and 16 may be curved instead of plane, all within the spirit of the present invention. When it is desired to either increase or decrease the angle between the members 15 and 16 all that will be necessary is to alter the end pieces 17 and 18 so as to increase or decrease the angle as may be desired. Secured to the portions 15 and 16 is a curved back or surface 19 of any desirable material and is positioned at such a curve as to be adapted to operate in the hollowed-out or recessed portion 2. The curved portion 19 is struck on the same center as the curved portion 20 of the recessed portion 2 so that as the members 15 and 16 together with the surface 19 operate the curved portions 19 and 20 will fit snugly so as to permit only a comparatively small amount of water to escape therebetween. It is to be understood that the members 15, 16 and 19 may be made of any desirable material as wood or metal as occasion may require and the surfaces 15 and 16 may be made of any desired size for accomplishing various results. Preferably the surface or member 15 is made considerably larger than the surface or member 16. The member 16 is preferably made simply sufficiently large to act as a bottom to the chamber formed by the curved member 19 and the end members 17 and 18, while the member 15 preferably is made considerably longer than the width of the member 19 and usually slightly higher. The dimensions and proportions in relation to each other of the members 15 and 16 may be varied for causing the dam to operate slightly different as various occasions may require. As shown in the drawings the stationary member 1 is made of masonry, but as will be evident, any suitable material may be used that will accomplish the same results.

The invention is designed to reduce the range of fluctuations in the water level of rivers and streams, increasing the height of water surface during seasons of drouth, by damming the flow and reduce the height during floods by lowering the crest providing a larger water way over the dam and thus increase the flow. As the water increases in height on the up-stream side of the dam it will enter the aperture 5 and press against the lower surface of member 16 and when the water has reached a certain depth the pressure exerted will be sufficient to overcome the weight of the crest 4 and will gradually raise the same as the water continues to rise.

When the crest has rotated so that member 15 is in a vertical position as shown in Fig. 4 it will be prevented from further rotation by suitable chains or other desired limiting means 21. At one end the chain 21 is secured to the crest at 23 and at the other to the stationary part of the dam at 24. The depressions or recessed portions 7 and 8 are adapted to receive the chains 21 and 22 when the crest is lowered. The air pipes 6, 9 and 10 are adapted to furnish air to the recessed portions 7 and 8 so as to prevent a vacuum forming underneath the member 15 when the crest is down and water flowing over the dam.

It will be observed that the movable crest is operated entirely by pressure of the water that is being dammed and is entirely automatic in its action. Assuming that the water level above the dam is below the stationary portion 1 and is rising gradually the movable crest, of course, being in its lowered position as clearly seen in Fig. 3, as the water rises the same en-

ters the chamber or hollowed-out portion 2 through the inlet 5. The crest being buoyant on account of the chamber formed by the parti-cylindrical member 3 and members 15 and 16 will rise, or more accurately speaking, rotate and lift the upper leaf from its horizontal position, keeping the upper edge above the water surface. As the water rises higher on the upstream side of the dam the pressure in the pressure chamber becomes greater and the crest continues its rotation until the upper leaf assumes a vertical position, when its further motion is arrested by the limiting means 21. As the water continues to rise the pressure exerted on the upper leaf or member 15 would tend to rotate the crest downward or in the opposite direction just described if it were not for the opposing pressure exerted on the lower leaf. Since the water exerts a pressure proportionately to its depth the intensity of pressure per unit area on the lower leaf is greater than that exerted on the upper leaf. By properly proportioning the area of the two leaves the moment of the force exerted against the lower leaf or member 16 may be made to exceed the moment of force exerted against the upper leaf until the water reaches the top of the upper leaf or member 15, at which stage in practical operation the two opposing forces should be equal and just balance each other. If the water should rise still higher and commence to overflow the member 15 the moment of the force tending to lower the crest will preponderate and the crest will rotate downward, thus allowing the water to escape over the dam. The weight of the crest assists in causing the same to rotate downward and taken with the force of the water that has raised to a height slightly above the dam, it will cause the crest to rotate downward until it is in the position shown in Fig. 3. In this new position the average depth of water over the lower leaf or member 16 is increased, the average pressure per unit area is increased, the total pressure is increased and consequently the moment of the lifting force is increased but this is much more than offset by the increase in moment of the water pressure against the upper leaf or member 15 due to the increased average depth of water over the same. As the water escapes over the dam its height gradually decreases and the pressure on the upper and lower leaves or members of the crest are gradually reduced. The moment of the force against the member 15 is reduced much faster than the moment of the force against the member 16, and finally a stage is reached by the continual flow of water over the dam when the uplifting moment preponderates and the crest rises again stopping all flow over the dam.

As above described, the members 15 and 16 are made of different sizes so as to accomplish various results and to allow the crest to be raised and remain in such position automatically until the water rises above the crest.

A dam made according to the present invention may be made of any size all within the spirit of the present invention as will be evident. A dam may be made with only one crest 4, or any number of crests 4 may be made according to the length of the dam. When making a dam of several movable crests as seen in Figs. 1 and 2 of the drawings, it is preferable to make the crests exactly alike so that they will act in the same way. Under some circumstances it may be desirable to have all the crests in a dam of a considerable length made

alike except one or two which may be adapted to be rotated downward before the remaining dams so as to cause the overflow of water to occur at any point that may be desired. This may be done as will be evident
 5 by simply increasing the area of the member 15 or reducing the area of the member 16. A dam formed in this way will automatically operate and maintain the level of the stream between certain predetermined limits according to the proportions at which the members
 10 15 and 16 are made. It will also be observed that the dam operates by the rise and fall of the water in the stream and uses no machinery of any kind for manipulating the crest, yet the crest is firmly held in an upright position for maintaining the water at any level,
 15 below the top of member 15.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A dam composed of a stationary member and a plurality of movable members hinged to said stationary member, said movable members being formed with hollow-air-tight compartments, and said stationary member being formed with a hollowed-out portion for accommodating said compartments, and a permanently unobstructed passageway from said hollowed-out portion to the up-stream
 25 side of the dam.

2. A movable dam comprising a plurality of sections arranged end for end and formed with members positioned at an angle to each other for resisting the moment of the water being dammed for regulating the position of said
 30 dam.

3. A device of the character described, comprising a stationary member having a hollowed-out portion and formed with an unobstructed passage from said hollowed-out portion to the up-stream side of the dam, and a movable crest
 35 pivotally mounted on said stationary member and formed with an enlarged portion, and a segment of a cylinder said segment being adapted to move in the hollowed-out portion of said stationary dam, a free circulation of water from the up-stream side of the dam passing through said
 40 passageway and acting upon one side of said segment together with the water on the up-stream side of the dam acting upon the upper side of said enlarged portion permitting automatic movement of said crest.

4. A device of the character described, comprising a stationary member, formed with a recessed-portion that is in free communication with the up-stream side of the dam, a movable member pivotally secured to said stationary member, and means for permitting said movable crest to be raised by water entering said recessed portion, and
 50 means for permitting said crest to be forced downward by the water being dammed.

5. A device of the character described, comprising a stationary member formed with a hollowed-out portion, and

an aperture for permitting free communication between said hollowed-out member and the upstream side of said
 55 stationary member, and a pivotally mounted crest secured to said stationary member, said pivotally mounted crest comprising an upper surface and a lower surface at angles to each other, said upper surface being of greater
 60 area than said lower surface, said surfaces receiving pressure in opposition to each other, and means for limiting the upward movement of the crest.

6. A device of the character described, comprising a stationary member with a depression and air tubes communicating therewith, a pivotally mounted crest secured to said
 65 stationary member and adapted to cover said depression, and a chain for limiting the upward movement of said crest, said chain being positioned in said depression when said crest is in its lowered position, said air tubes being adapted to prevent the creation of vacuum underneath the
 70 crest when the crest is being overflowed.

7. A device of the character described, comprising a stationary member, formed with a hollowed-out portion part-cylindrical in contour, and a permanently unobstructed
 75 inlet forming free communications between said hollowed-out portion and the upstream side of the stationary member, and a pivotally mounted crest secured to said stationary member comprising a parti-cylindrical member and a leaf secured thereto, said leaf and one surface of
 80 said parti-cylindrical member being adapted to receive pressure from the water that is being dammed for operating the crest.

8. A device of the character described, comprising a stationary member, a plurality of pivotally mounted crests secured to said stationary member and having portions
 85 adapted to move in said hollowed-out portion, means for permitting pressure from the water being dammed to raise said crest, means for limiting the upward movement of said crest, and means for permitting the water to automatically rotate downward said crest.
 90

9. A device of the character described, comprising a stationary member and a pivotally mounted member mounted thereon, said pivotally mounted member being formed with two faces at an angle to each other, said faces being of
 95 different sizes, said stationary member being formed with a hollowed-out portion for accommodating said movable member when in its lowered position, said hollowed-out portion being in free and unobstructed communication with the up-stream side of said stationary member at all times and permitting the water being dammed to act upon one
 100 face of said movable member, the water freely acting at all times upon the other of said faces for automatically regulating the position of said movable member.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE F. STICKNEY.

Witnesses:

CHAS. H. HOYT,

ROBERT E. HORTON.