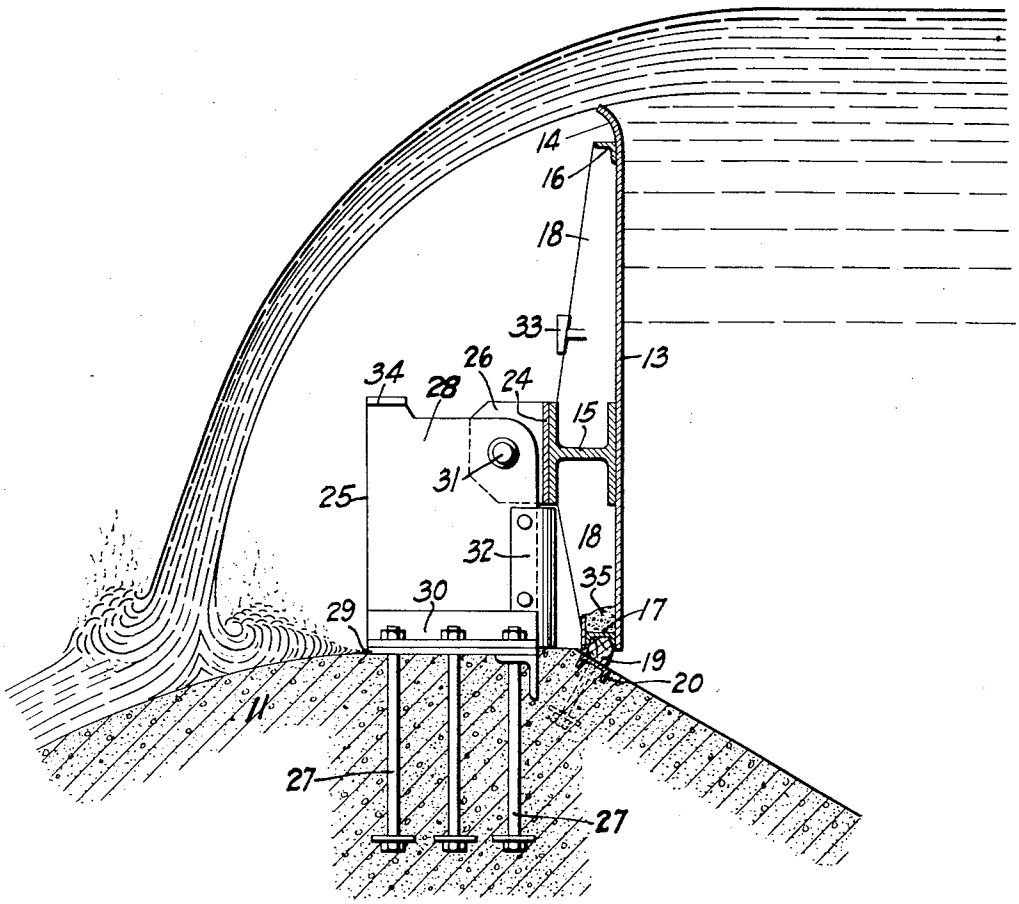
Dec. 12, 1933. A. YOUNG 1,938,675

CREST GATE

Filed Nov. 11, 1932 3 Sheets-Sheet 1

Fig. 1.



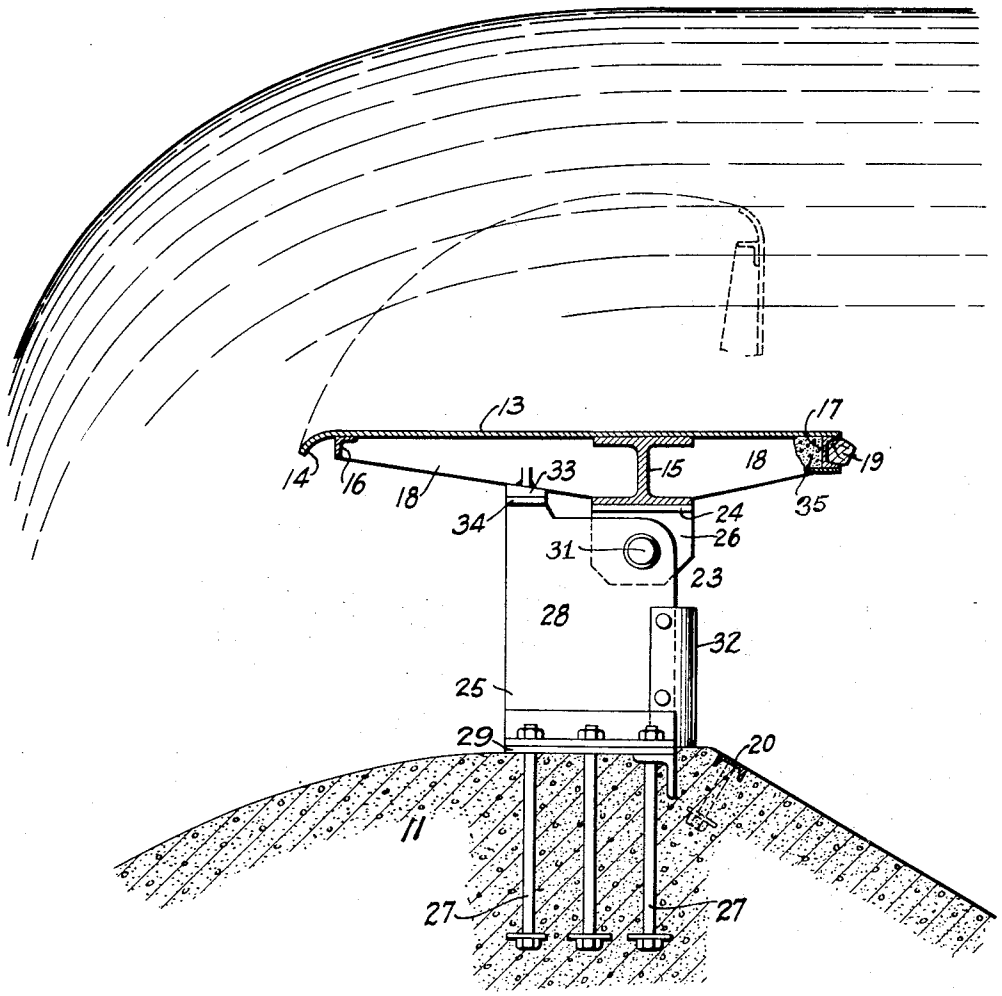
INVENTOR
ARTHUR YOUNG
BY
Malcolm D. Sammett
ATTORNEY

Dec. 12, 1933. A. YOUNG 1,938,675

CREST GATE

Filed Nov. 11, 1932 3 Sheets-Sheet 2

Fig. 2.



INVENTOR
ARTHUR YOUNG
BY
Malcolm F. Lamotte
ATTORNEY

Dec. 12, 1933. A. YOUNG 1,938,675

CREST GATE

Filed Nov. 11, 1932 3 Sheets-Sheet 3

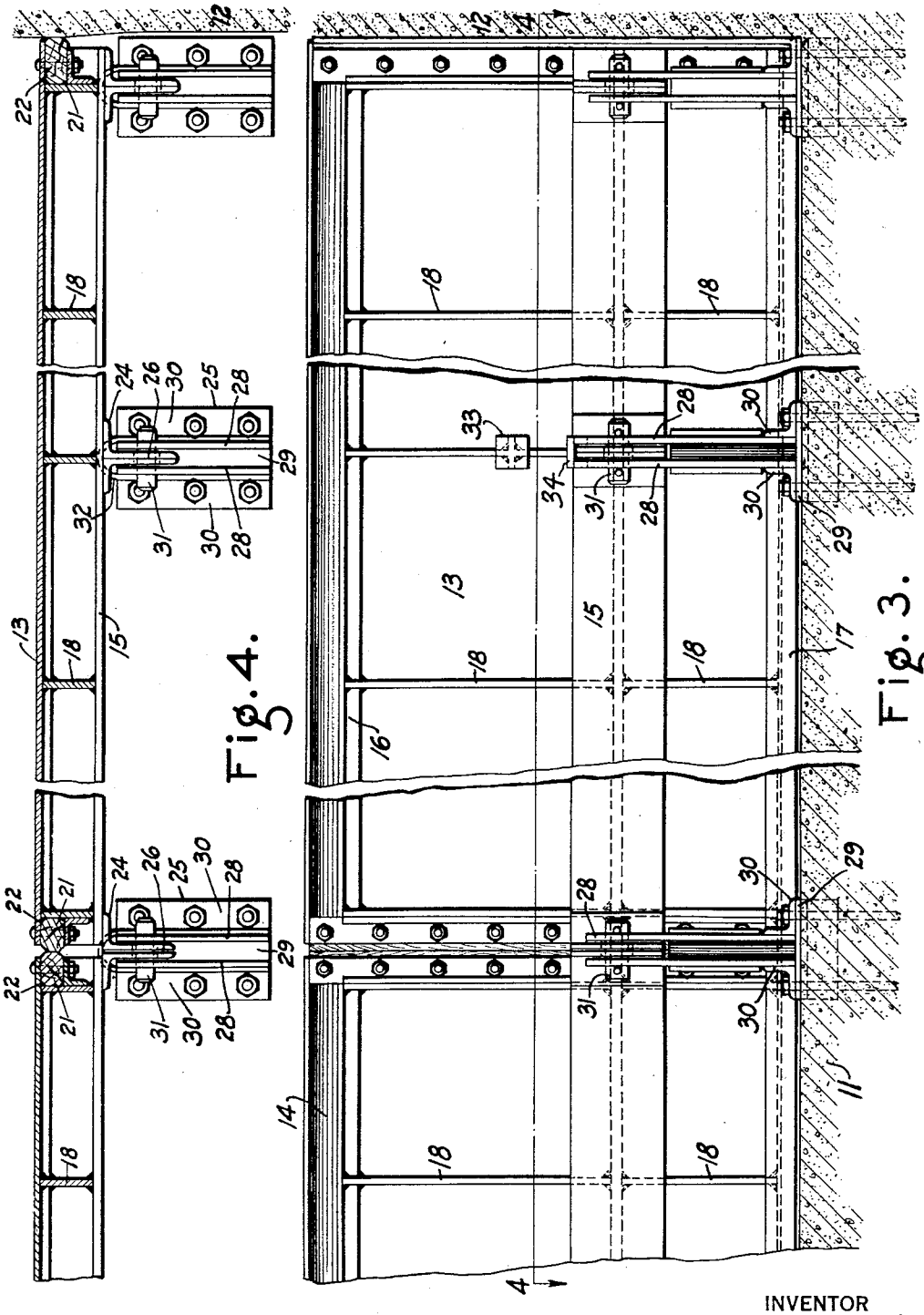


Fig. 4.

Fig. 3.

INVENTOR
ARTHUR YOUNG
BY
Malcolm F. Gaunt
ATTORNEY

Patented Dec. 12, 1933 1,938,675

UNITED STATES PATENT OFFICE

1,938,675

CREST GATE

Arthur Young, York, Pa., assignor to S. Morgan Smith Company, York, Pa., a corporation of Pennsylvania

Application November 11, 1932
Serial No. 642,147

2 Claims. (Cl. 61—26)

This invention relates to gates, wickets, and the like which are adapted to be installed on top of dams so as to increase the height of the impounded water.

An object of the invention is to provide an improved crest gate for dams.

Another object of the invention is to provide an improved crest gate which is adapted to remain in an upright position so long as the height of water does not increase above a predetermined amount, and which is adapted to automatically swing downwardly and permit passage of water thereunder, as well as thereover, when the height of the water increases a predetermined amount.

Another object of the invention is to provide an improved crest gate which is composed of a plurality of similarly formed sections.

Another object of the invention is to provide improved means for sealing the joints between the sections of the crest gate.

Another object of the invention is to provide an improved pivotal mounting or hinge for supporting the sections of the crest gate.

Another object of the invention is to provide an improved crest gate of the character mentioned, which is simple in construction, and reliable and exact in function under all conditions of service.

The invention also comprises certain new and useful improvements in the construction, arrangement and combination of the several parts of which it is composed, as will be hereinafter more fully described and claimed.

In the accompanying drawings:—

Figure 1 is a cross section of the crest of a dam, showing the application of my improved crest gate thereto, the gate being shown in section and in an upright position;

Fig. 2 is a view similar to Fig. 1 showing the gate in a substantially horizontal, or fully opened position;

Fig. 3 is a rear elevation of the gate structure shown in Fig. 1; and

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 3.

Referring to the drawings, the dam 11 may be formed from concrete, or any other suitable material.

At each end of the dam, or at suitable intervals, if the dam is relatively long, columns or pillars 12, may be formed, a portion of one pillar being shown at the right in Figs. 3 and 4.

A rotatable gate structure 13 is mounted on top of the dam 11. The gate structure 11 may be composed of one or more sections, depending upon the length of the dam, or the distance between the pillars 12. In the present embodiment of the invention, the gate structure is shown as comprising a plurality of sections.

The sections of the gate 13 are arranged along the crest of the dam 11, with the ends of one section abutting the ends of the adjacent sections means to be hereinafter described being provided for sealing the joints between the several gate sections and also the joints between the ends of the gate and the pillars 12.

If so desired the sections of the gate 13 may be similarly formed, so as to reduce the manufacturing costs to a minimum, and in Figs. 3 and 4, there is shown an end section and a portion of an intermediate section.

According to the present invention the several sections of the gate 13 are composed of structural steel members. By making the gate in this manner greater strength and rigidity can be obtained, and at the same time the sections will be lighter in weight as compared to cast metal parts of the same dimensions.

The main portion of each section of the gate 13 may be formed from a single rectangular piece of plate steel.

In order to increase the thickness of the overflowing sheet of water and thereby increase the discharge capacity, the upper longitudinal edge of the plate steel is curved rearwardly, as at 14, so as to provide an arcuate lip.

For the purpose of preventing buckling of the plate steel body portion of the gate, suitable braces or reinforcing means are provided on the rear side of the gate.

The main reinforcing member or brace may comprise an H bar 15, which is arranged longitudinally of the gate and is disposed adjacent to the pivots of the gate, as shown in Figs. 1 and 3.

Additional reinforcements or braces for each section of the gate are provided by an angle bar 16 which parallels the lip 14 and is located adjacent thereto, a channel bar 17 which is disposed along the bottom or lower longitudinal edge of each section, and a plurality of strips or bars 18 which extend transversely of the plate steel body portion, or at right angles to the longitudinally disposed reinforcing members 15, 16 and 17.

All of the above reinforcing parts may be formed from commercial stock readily purchased in the market, and said parts may be fastened to the plate steel body portion in any approved manner, such as by welding.

In order to prevent leakage of water past the several sections of the gate 13 when the gate is in an upright position, suitable seals are provided around the bottom edge and both ends of each section.

The seal at the bottom of the gate may comprise a strip of wood or other suitable material 19, which is mounted in the channel bar 17 heretofore referred to. The sealing strip 19 is adapted to contact with a sill or wear plate 20, embedded in the concrete of the dam, as shown in Fig. 1.

The sealing devices for each end of the sections of the gate may comprise strips of wood 21, mounted in grooves or channels 22, as shown in Fig. 4.

The sealing strips 19, 22 and the sill 20 and pillars 12, are so formed at their respective contact points as to provide water tight joints when the gate 13 is in its upright position illustrated in Fig. 1.

The several sections of the gate 13 are supported on hinges or pivots 23 which are disposed on the rear or downstream side of the gate.

The hinges or pivots 23 may comprise members 24 carried by the sections of the gate, and members 25 mounted on top of the dam 11 and constituting the main supporting members for the gate.

As shown in Figs. 1 and 4, the members 24 may each be formed from two pieces of angle iron. These two pieces of material are arranged together in the form of a T, and the cross arm portion thereof is welded or otherwise fastened to the H bar 15 heretofore referred to. The other arm 26 of each member 24 projects rearwardly from the body of the gate for a purpose to be hereinafter described.

The members 25 constitute brackets which are rigidly secured to the top of the dam 11 by any suitable means, such as anchor bolts 27.

The members 25 may each comprise a pair of spaced sides 28, preferably formed from substantially rectangular plates. The side plates 28 are mounted on a base plate 29, being secured thereto by means of angles 30. By forming each of the members 25 with the spaced sides 28, a bifurcated supporting bracket is provided, for receiving the arm 26 of the member 24, as shown in Fig. 4.

The arm 26 and the sides 28 of the members 24 and 25 are, respectively, formed with alined openings for receiving a pivot pin 31.

For the purpose of preventing the passage of debris and other material which might clog in the hinges and prevent the operation thereof, a deflector 32 is disposed on the upstream portion of each member 25. As shown in Figs. 1 and 4, the deflectors 32 are U shaped in plan and are so formed as to enclose the spaces between the side plates 28.

Means are also provided for limiting the downward swinging movement of the gate 13, said means comprising pads 33 and 34, carried, respectively, by the bars 18 and brackets 25.

In order to supplement the downward rotating forces and make the gate 13 more sensitive, the sections of the gate may be counterweighted. In the present instance the counterweights are shown as comprising suitable quantities of concrete which are placed on the rear or downstream side of each section of the gate, above the channel bar 17, as indicated at 35, Fig. 1.

When the gate 13 is in an upright position, as illustrated in Fig. 1, the gate provides means for increasing the height of the water impounded by the dam, so that, during seasons of normal or subnormal stream flow, a greater amount of water will be accumulated in the pond behind the dam 11, than would ordinarily be accumulated by the fixed or main dam structure.

The operation of the gate 13 depends on the principle of the pressure of water. The center of pressure of a body of water of a given depth is at one third the depth of water from the bottom, the pressure of the water is such that the gate 13, leaving the friction of the mechanism and other retarding forces out of consideration, is just balanced and ready to turn on this point. However, in actual practice it has been found advantageous to locate the pivots for the gate at a point slightly above the center of pressure acting against the gate, so that an increased pressure of water on the lower portion of the gate is obtained when the gate is upright, in order to tightly seat the gate, and also to prevent tilting movements of the gate due to slight variations in the height of the water.

The gate 13 is so constructed that when the height of the water flowing over the gate increases above a predetermined amount, the gate will automatically swing down stream to a substantially horizontal position, as illustrated in Fig. 2, and thereby permit the free passage of water over the dam 11. When the height of the water recedes a predetermined amount, the gate 13 is adapted to automatically right itself so as to again present a barrier for increasing the depth of water impounded by the dam.

Normally the gate 13 will be positioned as shown in Fig. 1. When the water flowing downstream increases beyond the normal depth the pressure of the water against the upper portion of the gate overbalances the pressure against the lower portion, and consequently the gate turns on the pivot pins 31, with the upper portion swinging downward and rearward and the lower portion swinging upward and forward. As illustrated in Figs. 1 and 2, this tilting movement of the gate is in a counterclockwise direction. When the gate begins to open the water will pass both under and over it, thus relieving the pond. Further opening movement of the gate will be prevented when the pads 33 rest on the pads 34, as shown in Fig. 2. In this position the gate will be fully open.

When the height of the water flowing past the gate diminishes, the gate will begin to close, due to the forces of the counterweights 35 which tend to pull the bottom portion of the gate downwardly, and as the height of the water gradually decreases, the gate will automatically right itself, so that when the center of pressure of the water falls to a point below the pivot pins 31 the gate will be again restored to its upright position, as shown in Fig. 1, and the marginal edges thereof tightly sealed in the manner heretofore described.

While one illustrating embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment or otherwise than by the terms of the appended claims.

What I claim is:—

1. A movable gate for dams comprising a reinforced plate steel gate body having pivot members mounted on the rear side thereof, each of said pivot members having an arm projecting outwardly from the gate body, brackets mounted

on the dam for supporting the gate body, each of said brackets having spaced side walls for receiving the arm of said gate pivot members, alined openings formed in said arms and the side walls of said brackets, said openings being disposed at a point slightly higher than one third the height of the gate body when said gate body is in a substantially upright position, a pivot pin mounted in the alined openings of each bracket and arm, a U-shaped guard enclosing the upstream end portions of each of said brackets, said guards being located beneath the pivot pins, channels formed along the bottom and side edges of said gate body, sealing strips mounted in said channels for sealing the joints between the gate body and the dam, and means carried by the brackets for limiting the downward swinging movement of the gate body.

2. A movable gate for dams comprising a body formed from a single sheet of plate steel, means for reinforcing said plate steel body including a rigid H-beam member extending longitudinally of the body on the downstream side thereof and disposed nearer to the bottom edge of the gate than to the top edge thereof, an angle iron strip paralleling said H-beam and disposed adjacent to the upper longitudinal edge of the body, a channel also paralleling said H-beam and disposed adjacent to the lower longitudinal edge of the body, and a plurality of bars disposed at right angles to the H-beam and extending from said angle iron to said channel, said H-beam, said angle iron, said channel, and said bars being integrally united with the plate steel body by welding, hinge members carried by said H-beam and projecting from the downstream side thereof, brackets carried by the dam for receiving the hinge members, alined openings formed in said hinge members and said brackets, and pins passed through said openings for pivotally connecting the gate to the brackets.

ARTHUR YOUNG.