F. W. HANNA.

AUTOMATIC CONSTANT DISCHARGE WATER GATE.

APPLICATION FILED DEC. 4, 1908.

911,720.

Patented Feb. 9, 1909.

Fig. 1

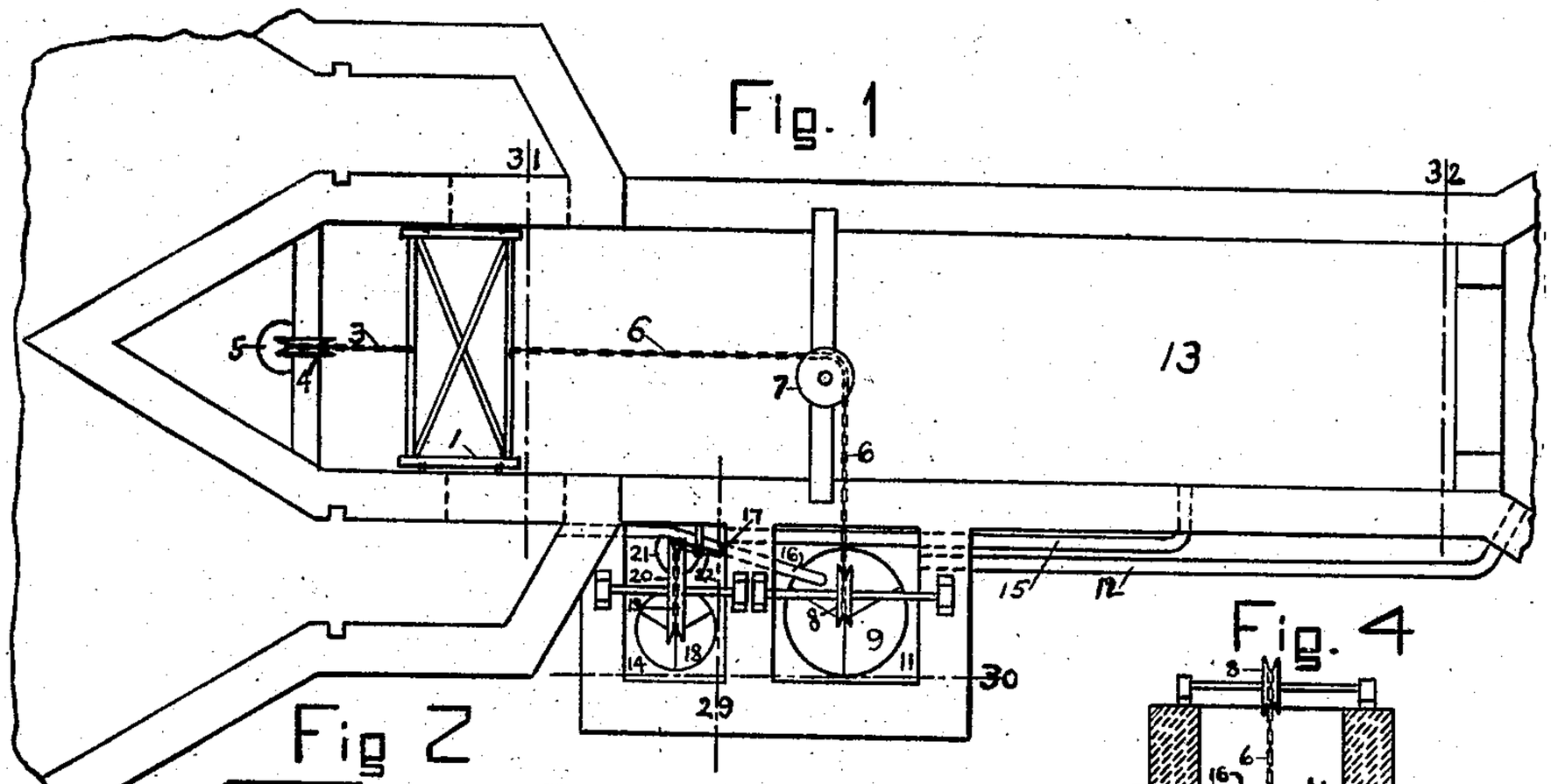


Fig 2

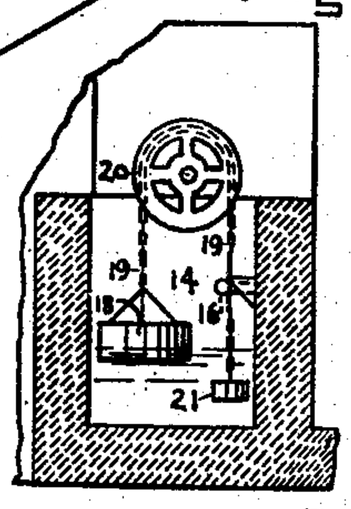


Fig. 3

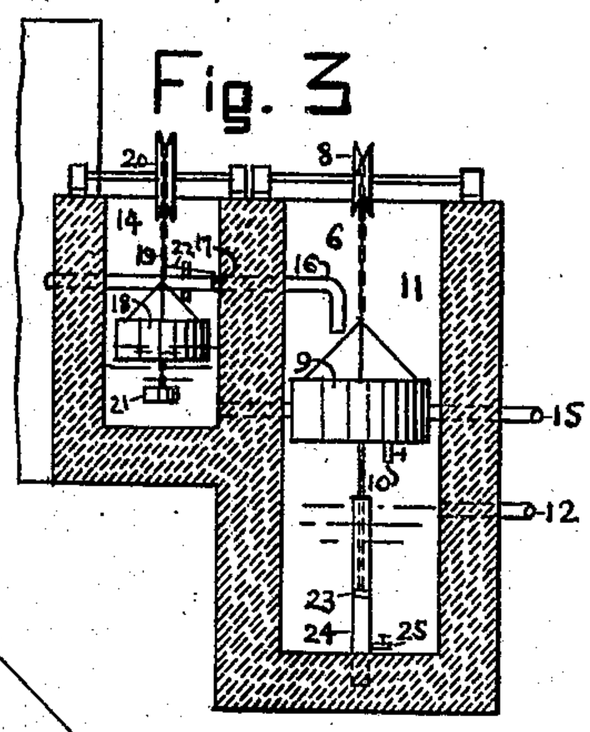


Fig. 4

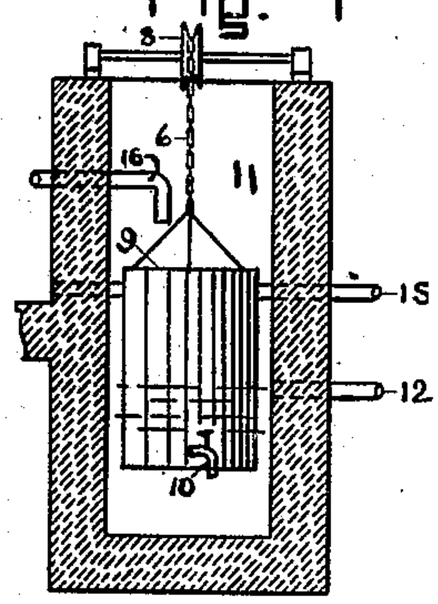


Fig. 5

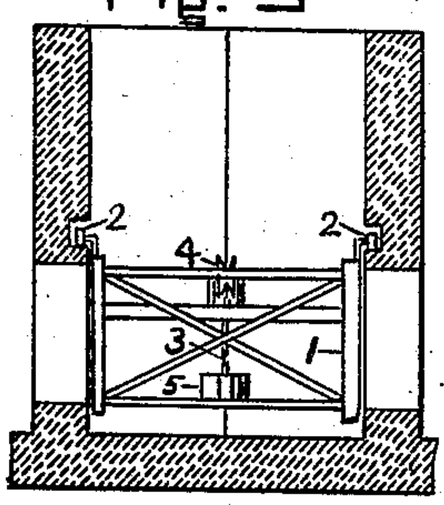


Fig. 6

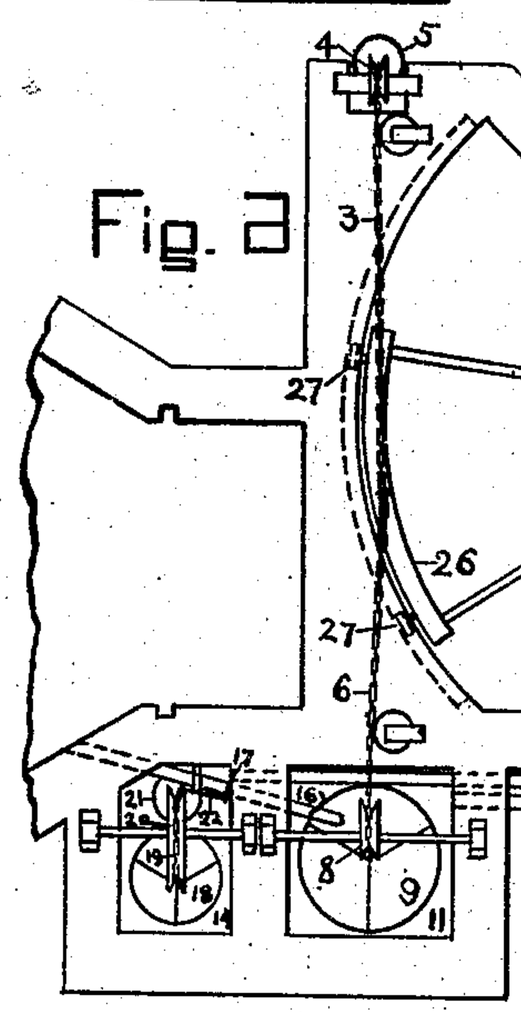


Fig. 7

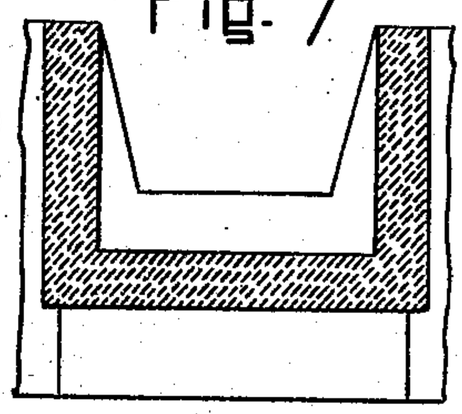


Fig. 8

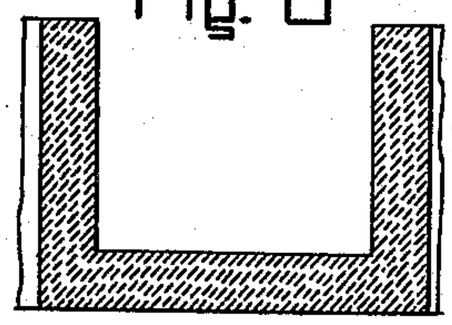
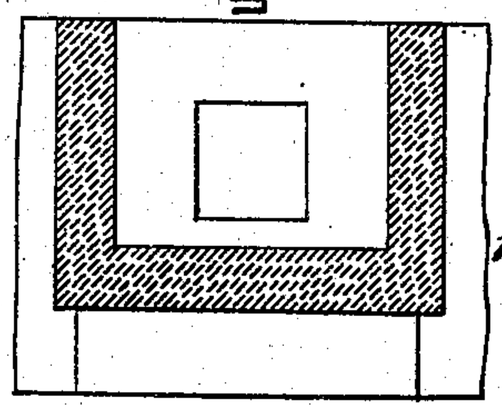


Fig. 9



Witnesses

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AUTOMATIC CONSTANT-DISCHARGE WATER-GATE.

No. 911,720. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed December 4, 1908. Serial No. 466,016.

To all whom it may concern:

Be it known that I, FRANK W. HANNA, a citizen of the United States, residing at Defiance, in the county of Shelby and State of Iowa, have invented a new and useful Improvement in Automatic Constant-Discharge Water-Gates, of which the following is a specification.

The invention relates to an automatic constant-discharge water gate controlled by the height of water in a measuring box in an outlet canal and has for its object the automatic regulation and measurement of water discharged from canals, reservoirs or other receptacles for carrying and storing water. This object is attained by means of a counterweighted float actuated by the height of water in the measuring box and controlling the discharge of a pipe matriculating with a supply canal or reservoir and discharging into a suspended bucket mechanically connected with a water gate controlling the flow of water through the measuring box into the outlet canal, the said water gate being operated automatically by the weight of water in the said bucket and by a counterweight likewise mechanically connected with the said water gate. The term "constant discharge" is used herein not in its absolute but in its practical sense.

In the accompanying drawing illustrating the invention, Figure 1 shows a plan of the headworks of an outlet canal provided with a rolling double water gate, a measuring box, a counterweighted float in a float chamber, an operating bucket in a bucket chamber, a counterweight mechanically connected with the water gate and the necessary connections for producing an operating unit; Fig. 2 shows a vertical section of the float chamber taken in a plane represented by the line 29 in Fig. 1 and a view of the connection of the float and its counterweight with the valve controlling the discharge of the supply pipe leading from the supply canal or reservoir to the operating bucket; Fig. 3 shows a vertical section of the float chamber and bucket chamber taken in a plane represented by the line 30 in Fig. 1 and a view of the operating bucket when equipped with an adjustable water cushion; Fig. 4 shows a similar section of the bucket chamber alone and a view of the operating bucket when working in an open water cushion; Fig. 5 shows a vertical section of a part of the outlet canal headworks taken in a plane represented by the line 31 in Fig. 1 and a view of the rolling double water gate; Fig. 6 shows a plan of the headworks of an outlet canal provided with a rolling cylindrical water gate and other appurtenances similar to those shown in Fig. 1; Fig. 7 shows a vertical section of the measuring box taken in a plane represented by the line 32 in Fig. 1 when the discharge of the measuring box passes over a weir; Figs. 8 and 9 show similar sections of the measuring box as constructed for passing its discharge respectively directly into the outlet channel and through an orifice.

In Figs. 1, 2, 3, 4 and 5 the gate 1, suspended on rollers 2, is attached by a chain 3 passing over a sheave 4 to a counterweight 5; and the gate is likewise attached by a chain 6 passing around sheaves 7 and 8 to the bucket 9 having an outlet 10 at the bottom thereof, all in such a manner that when the bucket rises the counterweight descends and the gate opens, and conversely when the bucket descends the counterweight rises and the gate closes. The bucket chamber 11 is connected by the pipe 12 with the outlet canal below the measuring box 13, and the float chamber 14 is connected by the pipe 15 with the measuring box 13. The supply pipe 16 connects the supply canal or reservoir with the operating bucket 9 and is provided with a controlling valve 17. The float 18 is connected by the chain 19 passing over the sheave 20 to the counterweight 21, and the chain 19 is attached to the controlling valve 17 by means of the lever 22. To the bottom of the operating bucket shown in Fig. 3 is attached an adjustable water cushion consisting of a piston 23 operating in a pipe 24 having a small adjustable discharge opening 25, the lower portion of the pipe being at all times submerged in the water of the bucket chamber. A portion of the operating bucket shown in Fig. 4 is submerged in the water of the bucket chamber, thus forming an open water cushion. The bucket chamber 11 shown in Figs. 1, 3, 4 and 6 may be provided with a discharge pipe 12 connected with the outlet canal or with any other convenient channel for disposing of excess water, or the operating bucket and its water cushion may be inclosed in a water-tight compartment or well from which the excess water may be mechanically removed.

The water gate to be used in the combinations claimed in this invention is not limited to the kind shown in Figs. 1 and 5 but may

be of any kind suitable for operation with the mechanism shown and claimed. Fig. 6 shows, as another kind of gate to which the mechanism can be readily adjusted, a cylindrical gate 26 suspended on rollers 27 and a vertical axis 28 and rotating about the said vertical axis. In other respects the operation of this gate is essentially similar to that of the gate shown in Figs. 1 and 5.

With the operating mechanism in equilibrium the positions of the float and its counterweight maintain the controlling valve slightly open so that a constant small discharge passes through the supply pipe, the operating bucket and the outlet at the bottom thereof. If the water surface in the measuring box rises, the float rises correspondingly and the float counterweight descends and opens the controlling valve, permitting a larger amount of water to enter the operating bucket than can be discharged through the bucket outlet, thus increasing the weight of the contents of the bucket and causing it to descend and to close the water gate sufficiently to lower the water surface in the measuring box to such an extent as to reëstablish equilibrium of the operating mechanism. On the other hand if the water surface in the measuring box falls, the float descends correspondingly and closes the controlling valve, permitting a less amount of water to flow into the operating bucket than is discharged through the bucket outlet, thus decreasing the weight of the contents of the bucket and permitting the counterweight to descend and to open the water gate sufficiently to raise the water surface in the measuring box to such an extent as to reestablish equilibrium of the operating mechanism.

Having thus described my invention, I now make the following claims:

1. The combination of a measuring box in an outlet canal receiving water from a supply canal or reservoir, a counterweighted float actuated by the height of water in the said measuring box, a supply pipe leading from the said supply canal or reservoir and having a valve controlled by the said counterweighted float, a suspended bucket receiving water through the said supply pipe and provided with an outlet and a water cushion, a water gate mechanically connected with the said bucket, and a counterweight mechanically connected with the said water gate, the whole producing automatically a constant discharge from the said supply canal or reservoir.

2. The combination of a measuring box in an outlet canal receiving water from a supply canal or reservoir, a counterweighted float actuated by the height of water in the said measuring box, a supply pipe leading from the said supply canal or reservoir and having a valve controlled by the said counterweighted float, a suspended bucket receiving water through the said supply pipe and provided with an adjustable outlet and a water cushion, a rolling double water gate mechanically connected with the said bucket, and a counterweight mechanically connected with the said water gate, the whole producing automatically a constant discharge from the said supply canal or reservoir.

3. The combination of a measuring box in an outlet canal receiving water from a supply canal or reservoir, a counterweighted float actuated by the height of water in the said measuring box, a supply pipe leading from the said supply canal or reservoir and having a valve controlled by the said counterweighted float, a suspended bucket receiving water through the said supply pipe and provided with an adjustable outlet and an adjustable water cushion with an adjustable outlet, a water gate mechanically connected with the said bucket, and a counterweight mechanically connected with the said water gate, the whole producing automatically a constant discharge from the said supply canal or reservoir.

4. The combination of a measuring box with a weir outlet in an outlet canal receiving water from a supply canal or reservoir, a counterweighted float actuated by the height of water in the said measuring box, a supply pipe leading from the said supply canal or reservoir and having a valve controlled by the said counterweighted float, a suspended bucket receiving water through the said supply pipe and provided with an outlet and a water cushion, a water gate mechanically connected with the said bucket, and a counterweight mechanically connected with the said water gate, the whole producing automatically a constant discharge from the said supply canal or reservoir.

5. The combination of a measuring box with a weir outlet in an outlet canal receiving water from a supply canal or reservoir, a counterweighted float actuated by the height of water in the said measuring box, a supply pipe leading from the said supply canal or reservoir and having a valve controlled by the said counterweighted float, a suspended bucket receiving water through the said supply pipe and provided with an adjustable outlet and an adjustable water cushion, a rolling double water gate mechanically connected with the said bucket, and a counterweight mechanically connected with the said water gate, the whole producing automatically a constant discharge from the said supply canal or reservoir.

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Witnesses:
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