J. A. MORRISON.

TIDE VALVE.

APPLICATION FILED MAR. 4, 1908.

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Fig. 1

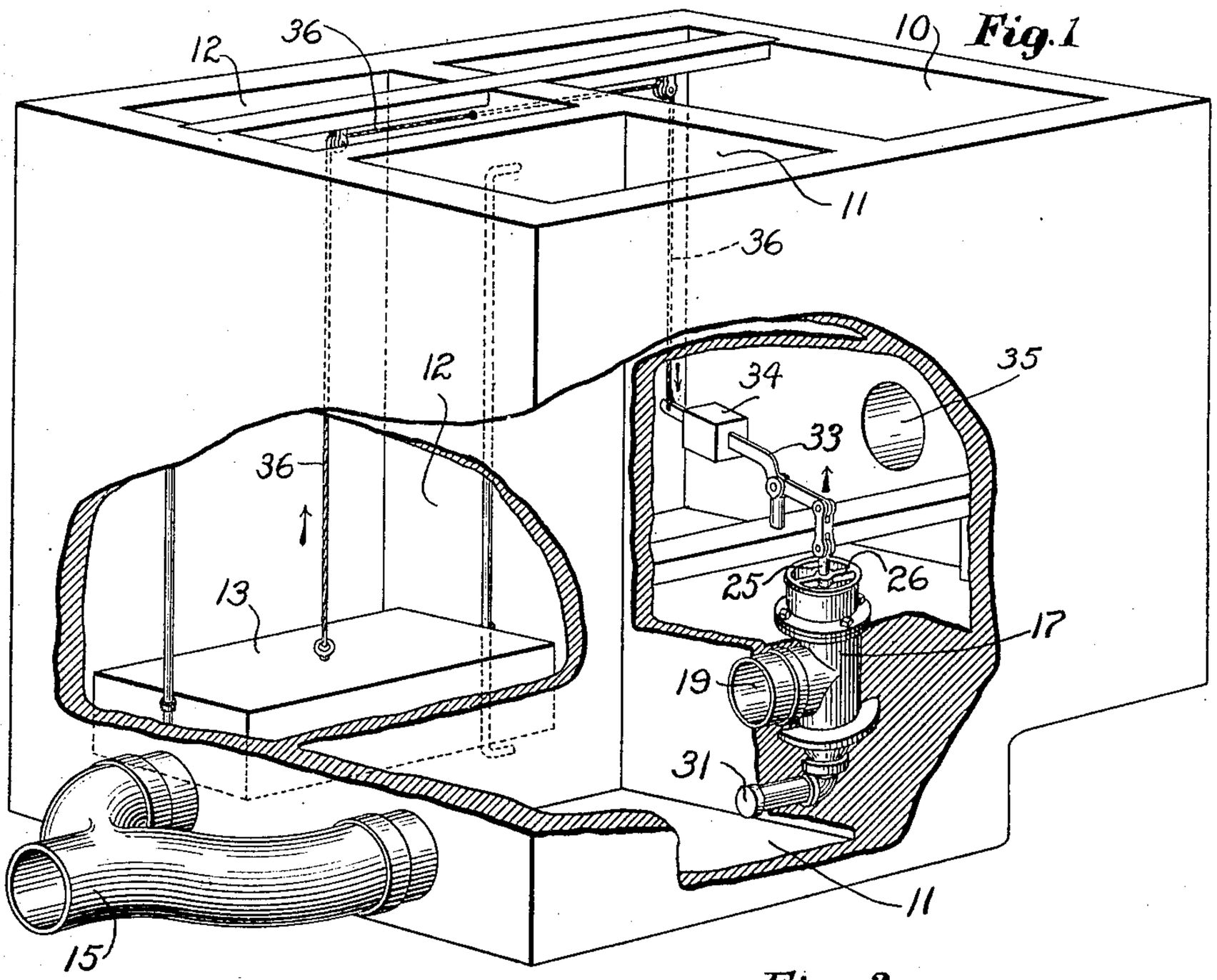
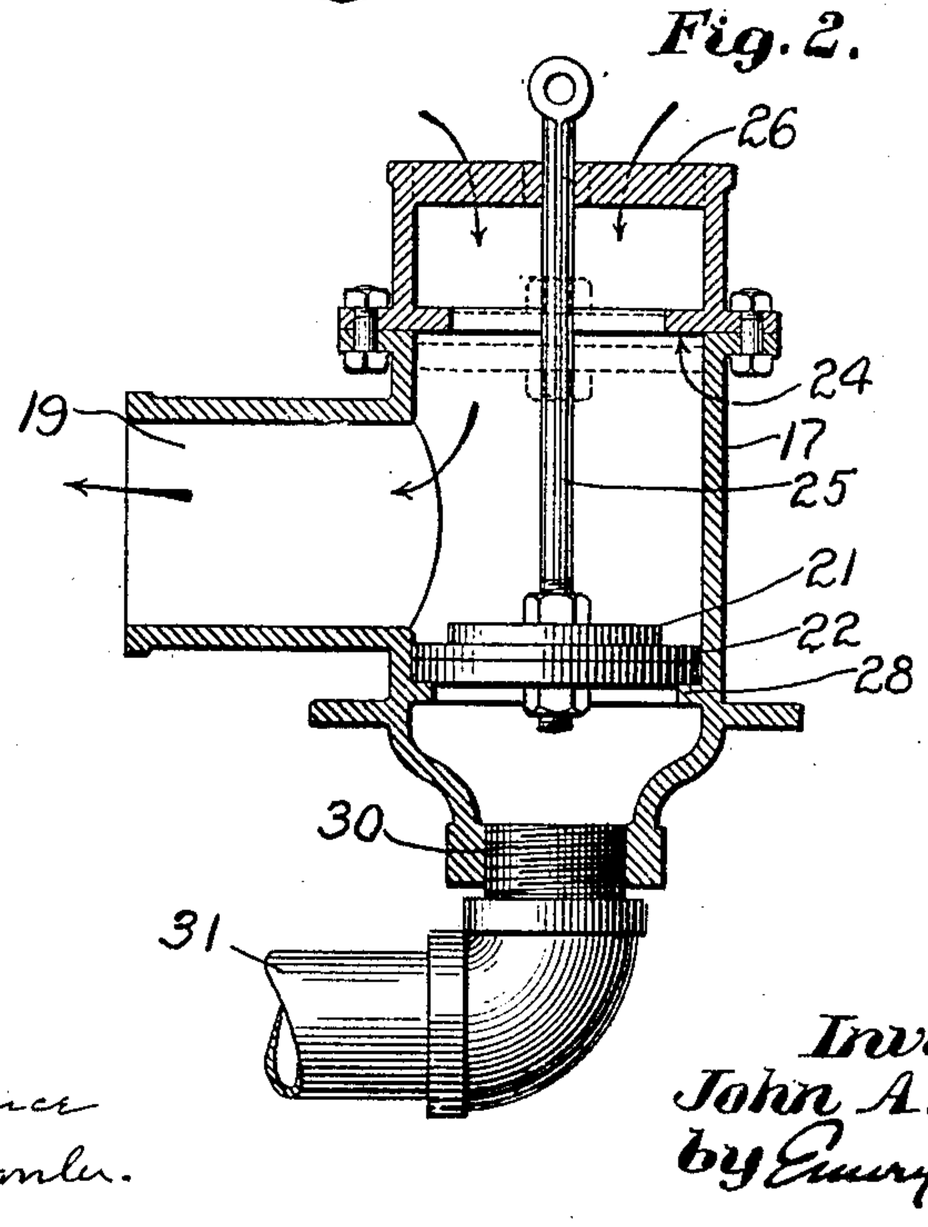


Fig. 2.



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UNITED STATES PATENT OFFICE.

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TIDE-VALVE.

No. 913,227. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed March 4, 1908. Serial No. 419,184.

To all whom it may concern:

Be it known that I, JOHN A. MORRISON, a citizen of the United States, residing at Beverly, in the county of Essex, Commonwealth of Massachusetts, have invented an Improvement in Tide-Valves, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention pertains to tide valves, intended more particularly to intervene between a land drainage system or the like and tidewater, to leave free drainage at low tide while preventing back flow in the drainage system on flood tide.

The character of the invention may be best understood by reference to the accompanying drawings, showing a single illustrative embodiment.

In the drawings: Figure 1 is a perspective, with a housing partly broken away, of the tide valve and its appurtenances; and Fig. 2 is a vertical, central section of a preferred form of valve.

Referring to the drawings: An embodiment of the invention comprises preferably one or more chambered reservoirs, which may be sunk in a dike or the like interposed between the land to be drained and tidewater. There may be a drainwater chamber 10 and a discharge chamber 11, and, if desired, an additional chamber 12 inclosing a tide-controlled float device 13 to govern the operation of the tide valve. In the specific form illustrated in the drawings the chambers 10, 11 and 12 are formed in a concrete structure, which may be equipped with a suitable cover. The discharge chamber 11 and the float chamber 12 communicate by a branch pipe 15 with the tidewater. During ebb tide the pipe 15 serves as a drainage terminal, through which the drainwater escapes and on flood tide the pipe 15 is, of course, entered by tide water which thereupon fills to a greater or a less degree the chambers 11 and 12.

Located in the chamber 10, or in any other practicable situation, is the tide valve proper, shown in longitudinal section in Fig. 2. This valve consists of a casing 17, having a lateral discharge through the pipe 19 into the discharge chamber 11. The valve proper consists preferably of a piston 21, having a yielding gasket 22 preferably of rubber. The piston 21 may be so formed, as by being rabbeted peripherally, that part of it will project through the valve seat 24 when the valve is closed, while the rubber gasket 22 presses snugly against said seat and makes a tight closure therewith. The piston 22 is mounted on a stem 25, which is mounted for vertical movement in a yoke 26. It will be noted in Fig. 1 that the yoke 26 is preferably narrow, leaving the top of the casing 17 substantially wide open to receive the inflow of drainwater from the chamber 10. When the valve is entirely open the piston 21 seats on an annular shoulder 28 within the casing 17. The lower end of the casing 17 may have an outlet 30, communicating by a pipe 31 with the discharge chamber 11, this outlet 30 providing a convenient means for cleaning out the casing and removing sand or other foreign matter therefrom. It may be closed by a cap or plug.

Referring now to Fig. 1, an eye at the upper end of the valve stem 25 is connected to a valve operating lever 33, having at its opposite end a valve closing weight 34. The tide-governed float 13 is connected to the valve operating lever 33 by a suitable flexible cable 36, or the like, which passes over pulleys suitably mounted in the structure of the valve housing.

In the operation of the specific illustrative devices described above the valve, at low tide, is open, standing in full line position of Fig. 2. The float 13 stands in a lowermost position, and being heavier than the valve operating weight 34, the latter is held elevated to keep the valve open. Under these circumstances, the drainwater is free to pass from the chamber 10 through the top of the casing 17, past the valve seat 24, through the discharge pipe 19, through the discharge chamber 11, finally escaping through the pipe 15. Obviously, the drainwater has a free flow without obstruction, entering by the pipe 35. The rising water, at flood tide, arrests the escape of drainwater through the pipe 15, causing the latter, together with the tidewater, to back up through said pipe and accumulate in the discharge chamber 11 and the float chamber 12. With the accumulation of water in the latter chamber the float is elevated, thereby relieving the valve operating weight 34 from the opposing weight of the float 13, and permitting the former to descend and elevate the valve piston 22 toward its seat 24. Preferably, before the rising tide has ascended to the height of the

pipe 19 in the chamber 11, the float has risen sufficiently to permit a complete closure of the valve piston 21. Further rise of the tide may cause the water to accumulate to a considerable depth in the discharge chamber 11, so as to exert a heavy upward pressure from beneath the valve piston 21, tending to force the latter into firm engagement with its seat 24 and effectually preventing leakage between said seat and the rubber gasket 22. To contribute to this effective valve closure, caused by the tidewater itself, the closed position of the valve piston 21 is preferably located at some depth below the surface of water in the chamber 11 at high tide.

The efficiency of the above described arrangement is such that the valve is held firmly closed against leakage by the rising tide; while, at the same time, it is readily responsive to the ebbing tide to open and permit the normal operation of the drainage system as described.

It is to be understood, of course, that the proper scope of the invention is by no means limited to the specific construction and arrangement shown in the drawings and described above for purposes of explanation. As will appear to those skilled in the art, the illustrative embodiment is susceptible of wide modification and variation. Moreover, it is not essential that all the features of the invention be used conjointly since they may be used to advantage separately, in the combinations and subcombinations defined in the subjoined claims.

Claims—

1. Apparatus of the character described comprising, in combination, a chambered concrete structure arranged to be sunk in a dike or the like between a drainage system and tidewater, and having a tidewater chamber and a drainwater chamber; a pipe between said chambers; a valve to control said pipe; a weight to close the valve, the closed position thereof being at a considerable depth below the surface of water at high tide whereby pressure of tidewater contributes to hold the valve closed; and tide governed float means to control the operation of the valve.

2. Apparatus of the character described comprising, in combination, a chambered structure arranged to be sunk below high tide level, having a tidewater chamber and a drain water chamber; an upwardly closing valve to govern communication between said chambers, the lower face of said valve being accessible to and acted upon by rising tidewater which contributes to hold the valve securely closed; and tide governed float means for positively opening and closing the valve.

3. Apparatus of the character described comprising, in combination, a chambered structure comprising a drainwater chamber, a tidewater chamber and a separate float chamber; a pipe between the drainwater chamber and tidewater chamber; a valve to control communication through said pipe; and valve governing connections between the valve and a float located in the float chamber.

4. Apparatus of the character described comprising, in combination, a tide restraining wall arranged to be interposed between a tide conduit and a drain conduit; means providing communication through said wall, said means being located in a position to be submerged at high tide; a valve to control communication through said means, having yielding closure means between the valve and its seat, arranged to be put under pressure by the rising tide to give a tight fit against leakage; and provision for opening and closing the valve by reference to the condition of the tide.

5. Apparatus of the character described comprising, in combination, a tide restraining wall arranged to be interposed between tidewater and a drain; a valve controlling communication through said wall, opposite faces of said valve being accessible respectively to accumulated drainwater and accumulated tidewater, the valve being arranged so that the tide water assists in closing it and the drainwater assists in opening it; and means separate from the valve to govern the operation of the valve by reference to the condition of the tide.

6. Apparatus of the character described comprising, in combination, a chambered structure having a drainwater chamber and a tidewater chamber, the bottom of the former being elevated above that of the latter; conduit means between said chambers opening into the tidewater chamber below the bottom of the drainwater chamber; a valve to control the conduit means; and means to govern the operation of the valve by rising and falling tide.

7. Apparatus of the character described comprising, in combination, a valve casing having a top opening to drainwater and a lower opening to tidewater; a piston valve having a closed position between said openings; and means to operate the valve by rising and falling tide.

8. Apparatus of the character described comprising, in combination, a valve casing having a top opening and a laterally projecting pipe; a piston valve arranged to be closed between said openings; yielding means such as a rubber gasket to be interposed between the valve and its seat when closed; a rest for the valve when opened, removed from both openings; and tide governed valve operating means.

9. Apparatus of the character described comprising, in combination, a tide restraining wall; a valve casing having a laterally extending pipe projecting through said

wall; a concrete bed for said casing; an opening therein for drainwater; a valve to close communication between said opening and the pipe; and tide governed valve operating means.

10. Apparatus of the character described comprising, in combination, a valve casing having an opening accessible to tidewater and another opening accessible to drainwater; a piston valve closable to separate said openings; and a cleanout for the casing arranged to discharge into tidewater.

11. Apparatus of the character described comprising, in combination, a valve casing having an opening to drainwater, and an opening to tide water at a different level; a valve having a closed position between said openings; and means to operate the valve by rising and falling tide.

12. Apparatus of the character described comprising, in combination, a tide restraining wall; a valve casing having a pipe projecting through said wall; an opening in the valve casing for drainwater; a valve to close communication between said opening and the pipe; and means to operate said valve.

13. Apparatus of the character described comprising, in combination, a valve casing having an opening accessible to tide water and another opening accessible to drainwater; and a piston valve closable between said openings with tide water on one side and drain water on the other.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN A. MORRISON.

Witnesses:

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