

No. 646,929.

Patented Apr. 3, 1900.

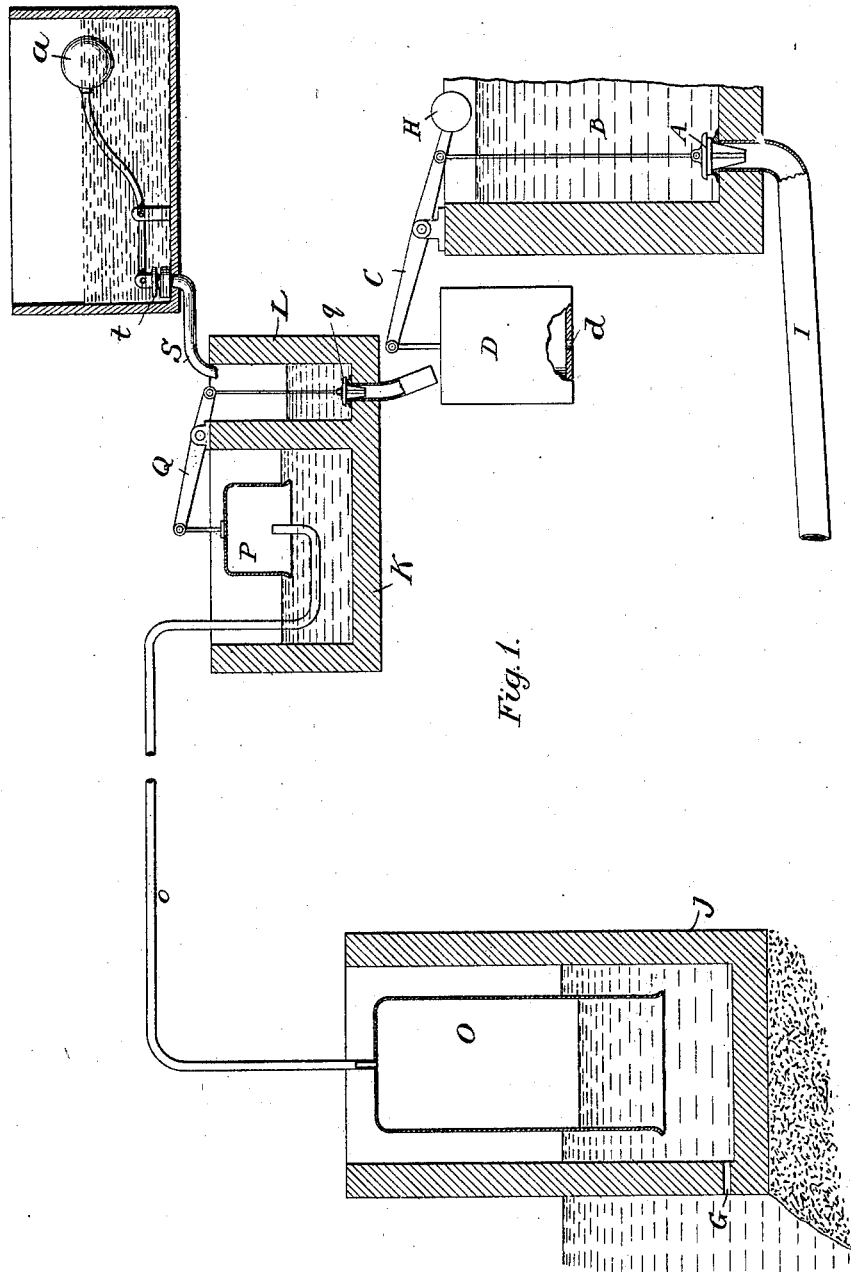
D. CAMERON, F. J. COMMINS & A. J. MARTIN.

SELF ACTING VALVE FOR REGULATING DISCHARGE OF SEWAGE INTO TIDAL WATERS.

(Application filed July 25, 1899.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
S. M. McColl,
E. J. Clarkson.

Inventors:
D. Cameron,
F. J. Commis,
A. J. Martin
By J. C. Somers
Attorney.

No. 646,929.

Patented Apr. 3, 1900.

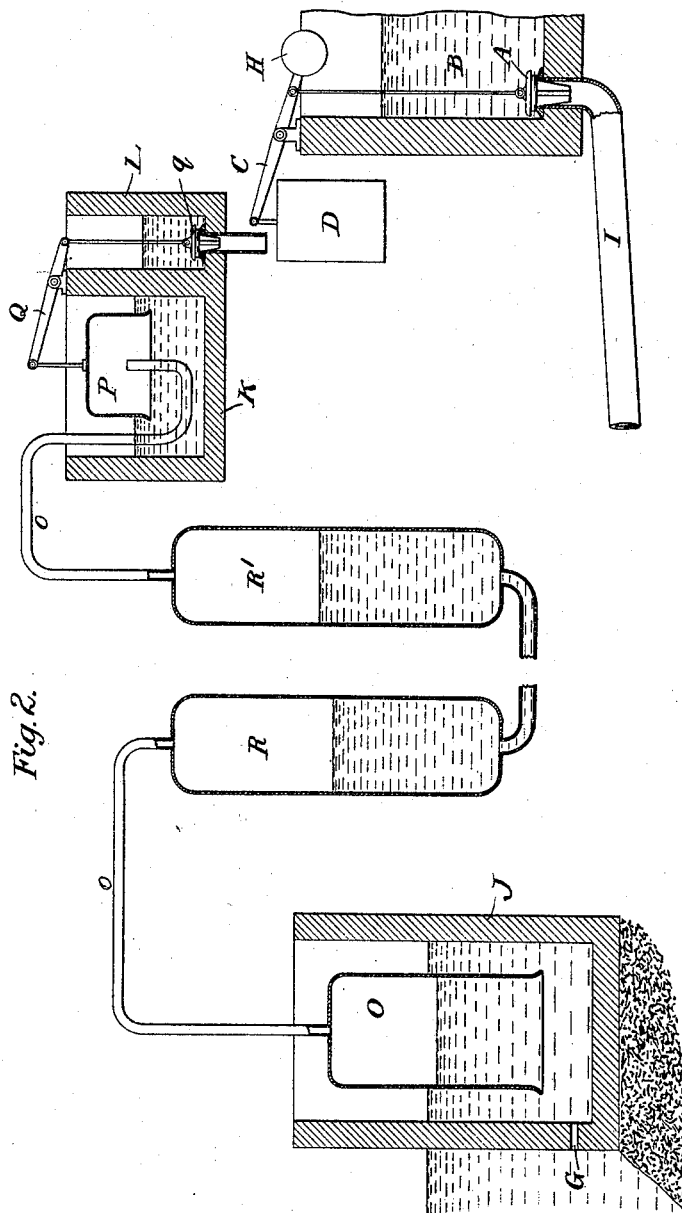
D. CAMERON, F. J. COMMIN & A. J. MARTIN.

SELF ACTING VALVE FOR REGULATING DISCHARGE OF SEWAGE INTO TIDAL WATERS.

(No Model.)

(Application filed July 25, 1899.)

3 Sheets—Sheet 2.



Witnesses:
S. M. McCall,
E. W. Clarkson.

Inventors:
D. Cameron
F. J. Commis
A. J. Martin
By J. B. Somes
Attorney.

No. 646,929.

Patented Apr. 3, 1900.

D. CAMERON, F. J. COMMINS & A. J. MARTIN.

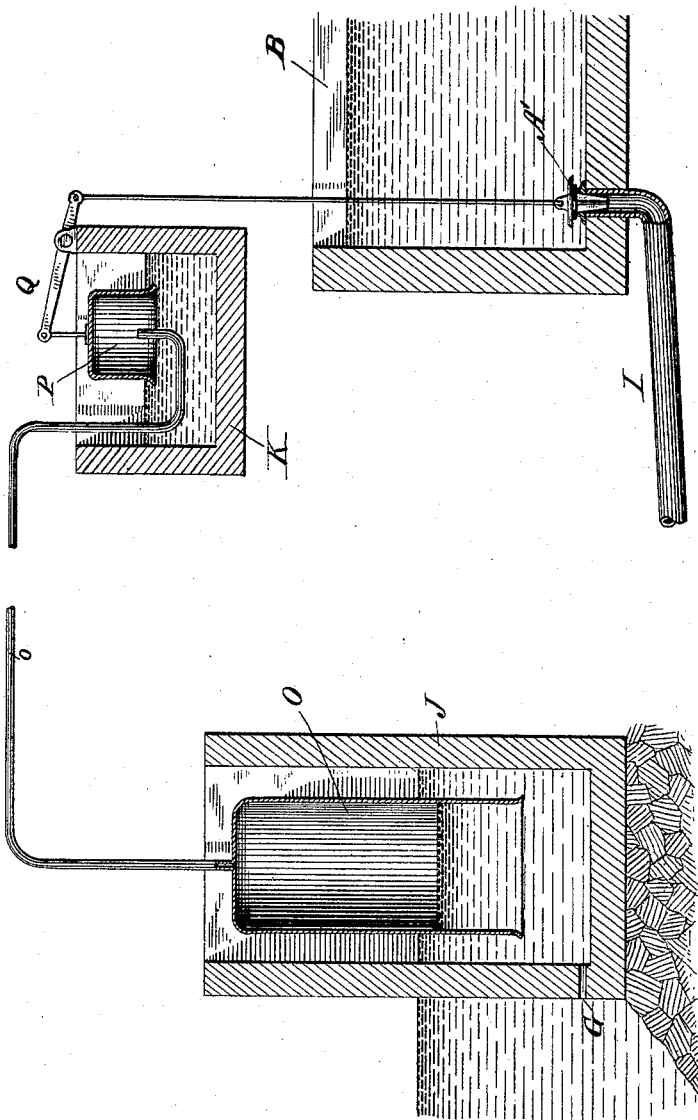
SELF ACTING VALVE FOR REGULATING DISCHARGE OF SEWAGE INTO TIDAL WATERS.

(No Model.)

(Application filed July 25, 1899.)

3 Sheets—Sheet 3.

Fig. 3.



WITNESSES:

Harry King,
S. M. McCall.

INVENTORS

D. Cameron
F. J. Commings
A. J. Martin
J. B. Jones,
ATTORNEY

UNITED STATES PATENT OFFICE.

DONALD CAMERON, FREDERICK J. COMMEN, AND ARTHUR J. MARTIN, OF
EXETER, ENGLAND.

SELF-ACTING VALVE FOR REGULATING DISCHARGE OF SEWAGE INTO TIDAL WATERS.

SPECIFICATION forming part of Letters Patent No. 646,929, dated April 3, 1900.

Original application filed November 7, 1898, Serial No. 695,786. Divided and this application filed July 25, 1899, Serial No. 725,076. (No model.)

To all whom it may concern:

Be it known that we, DONALD CAMERON, FREDERICK JAMES COMMEN, and ARTHUR JOHN MARTIN, subjects of the Queen of Great Britain, residing at Exeter, in the county of Devon, England, have invented new and useful Self-Acting Valves for Regulating the Discharge of Sewage into Tidal Waters, (for which we have made application for Letters Patent in Great Britain, bearing No. 8,429, dated April 9, 1898, and No. 9,767, dated April 28, 1898,) of which the following is a specification.

This invention relates to the discharge of sewage or sewage effluent into tidal waters, and is particularly applicable for use in cases where it is not desirable or convenient to place the storage-tank in which the sewage or sewage effluent collects in close proximity to the tidal water.

Our present invention is a modification of the arrangement described in our prior application for United States patent, Serial No. 695,786, filed November 7, 1898, (of which the present application is a division,) according to which valves are arranged to open and close automatically, so that the discharge can only take place at certain states of the tide, the sewage which comes down at other states of the tide being stored in a suitable tank or receptacle.

In order that our invention may be fully understood, we will proceed to describe the same by the aid of the accompanying drawings, in which—

Figure 1 is a vertical section of an arrangement we may employ when it is desirable to place the storage-tank at some distance from tidal water. Fig. 2 represents a vertical section of a modified form of the arrangement shown in Fig. 1 and which may be employed when the distance of the storage-tank from the tidal water is very great. Fig. 3 represents a vertical section of another form of our apparatus in which the discharge-valve is connected directly to the lever from which the bell is suspended.

In the form shown in Fig. 1 a vessel O, having an opening at or near its bottom, is fixed in some convenient place where the tide may have access to it, preferably in a chamber J, having an opening G for the tidal water. A pipe *o* is led from the top of this vessel O above the level of the highest tide to a point near the storage-tank B, into which the sewage or sewage effluent is delivered after treatment and from which it is to be discharged into the tideway. This pipe *o* terminates under a small inverted vessel or bell P, which dips into the water or other liquid in a tank K and is suspended so that it may rise or fall. This bell P may be suspended from a lever Q, at the other end of which is hung the discharge-valve A', on the opening of which the sewage or sewage effluent will be enabled to pass from the storage-tank B through the pipe I into the tideway, as shown in Fig. 3, or it may, as shown in Figs. 1 and 2, be connected with a smaller valve *q*, which admits water to the actuating-bucket D. In either case the valve connected with the bell P will be normally closed. As the tide-water rises in the vessel O the air therein will be expelled along the pipe *o* under the bell P and will return to the vessel O when the tide falls.

As long as the tide rises the pressure of the air under the bell P will keep valve *q* closed; but when it falls, such pressure ceasing, bell P will fall, thus opening valve *q* and filling bucket D, and consequently opening the discharge-valve A. The bucket D will slowly empty itself through an opening *d* in the bottom thereof, thus permitting the valve A to close after the discharge, or said bucket D may be emptied in any other suitable manner. The water is supplied to the tank L, in which the valve *q* is disposed, from any suitable source and is automatically cut off by any suitable means as soon as the necessary quantity has entered the tank. The means shown comprise a pipe S, having a valve *t* therein controlled by a float *u*.

If the pipe *o* be long, the arrangement shown in Fig. 2 may be employed, in which the pipe

o is led from the first vessel O into the top of a second vessel R containing liquid, said pipe o then continuing directly under the bell P or, as shown, being first connected to the bottom of a third vessel R', also containing liquid, and from the upper part of which vessel R' the pipe o is continued under the bell P. In either case the action will be the same. During the rise of the tide there will be a flow toward the bell P, and when the tide falls this flow will be reversed. The pressure of the air outside the bell P will then force it down, opening the valve connected therewith. If this be the discharge-valve A, the contents of the storage-tank B will be released. If it be the smaller valve g, liquid will be admitted to the actuating-bucket D, by means of which the discharge-valve A will be opened. The latter may be closed by the means already described.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of a valve, a lever to which said valve is connected, a bell suspended from said lever, a liquid seal for said bell, and means for alternately supplying and relieving fluid-pressure under said bell at determinate intervals whereby said valve is opened and closed at the expiration of stated periods.

2. The combination of a valve, a lever to which said valve is connected, a bell suspended from said lever, and means operated by a rising and falling liquid for alternately supplying and relieving fluid-pressure under said bell at determinate intervals whereby said valve is opened and closed at the expiration of stated periods.

3. The combination of a principal valve, an actuating-valve therefor, means controlled by said actuating-valve for operating said principal valve, a lever to which said actuating-valve is connected, a bell suspended from said lever, a liquid seal for said bell, and means for alternately supplying and relieving fluid-pressure under said bell at determinate intervals whereby said valve is opened and closed at the expiration of stated periods.

4. The combination of a principal valve, a lever to which said principal valve is connected, a bucket suspended from said lever, a water-supply adapted to be discharged into said bucket, an actuating-valve for controlling said supply, a lever to which said actuating-valve is connected, a bell suspended from said lever, a liquid seal for said bell, and means for alternately supplying and relieving fluid-pressure under said bell at determinate intervals whereby said valve is opened and closed at the expiration of stated periods.

5. The combination of a valve, a lever to which said valve is connected, a bell suspended from said lever, a liquid seal for said bell, a vessel disposed in a tidal or rising and

falling liquid and having an opening at or near its bottom, and a fluid connection extending from said vessel and terminating under said bell, whereby the valve is held closed during the rise of the tide and opened on the fall thereof.

6. The combination of a valve, a lever to which said valve is connected, a bell suspended from said lever, a liquid seal for said bell, a vessel disposed in a tidal or rising and falling liquid, and having an opening at or near its bottom, a fluid connection extending from said vessel and terminating under said bell, whereby the valve is held closed during the rise of the tide and opened on the fall thereof, and a liquid-containing vessel disposed in the line of said fluid connection to maintain the function thereof through a considerable distance.

7. The combination of a valve, a lever to which said valve is connected, a bell suspended from said lever, a liquid seal for said bell, a vessel disposed in a tidal or rising and falling liquid, and having an opening at or near its bottom, a fluid connection extending from said vessel and terminating under said bell, whereby the valve is held closed during the rise of the tide and opened on the fall thereof, and a plurality of vessels for containing a liquid disposed in the line of said fluid connection for maintaining the function thereof through a considerable distance.

8. In an apparatus for discharging sewage or sewage effluent into tidal waters, the combination of a tank for containing the sewage provided with a discharge-valve, and disposed at a considerable distance from said tidal water, a vessel disposed in said tidal water and adapted to open and close said valve on the rise and fall of the tide, and connecting mechanism disposed between said vessel and said valve.

9. In an apparatus for discharging sewage into tidal waters, the combination of a tank for containing the sewage, provided with a discharge-valve, and disposed at a considerable distance from said tidal waters, a vessel disposed in said tidal water and adapted to open and close said valve on the rise and fall of the tide, and connecting mechanism disposed between said vessel and said valve, said mechanism comprising a lever connected to said valve, a bell connected to said lever, a pipe extending from said vessel and terminating under said bell for supplying and relieving the fluid-pressure under the bell thereby opening and closing the valve at determinate intervals.

10. In an apparatus for discharging sewage into tidal waters, the combination of a tank for containing the sewage provided with a discharge-valve and disposed at a considerable distance from said tidal waters, a vessel disposed in said tidal water and adapted to open and close said valve on the rise and fall

of the tide, and connecting mechanism disposed between said vessel and said valve, said mechanism comprising a lever connected to said valve, a bell connected to said lever, a
5 pipe extending from said vessel and terminating under said bell for supplying and relieving the fluid-pressure under the bell thereby opening and closing the valve at determinate intervals, and a liquid-containing vessel disposed in said pipe between said vessel and 10 bell.

DONALD CAMERON.
FRED. J. COMMINS.
ARTHUR J. MARTIN.

Witnesses:

GEO. QUICK,
E. J. HARRIS.