H. BEDDOES.

AIR FLUSHING APPARATUS.

APPLICATION FILED JAN. 27, 1910.

1,014,363.

Patented Jan. 9, 1912.

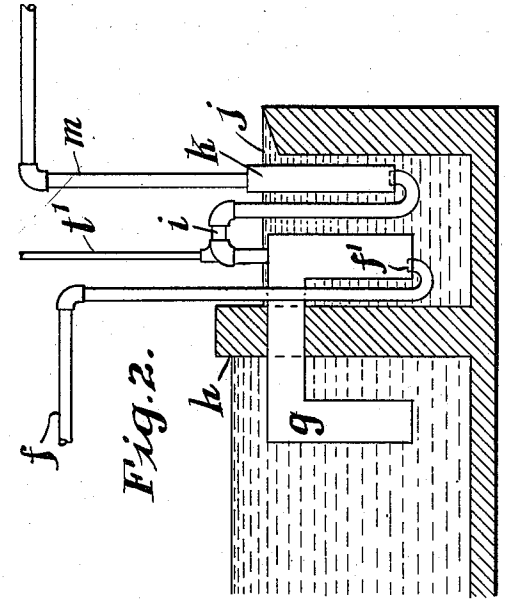

Fig. 2.

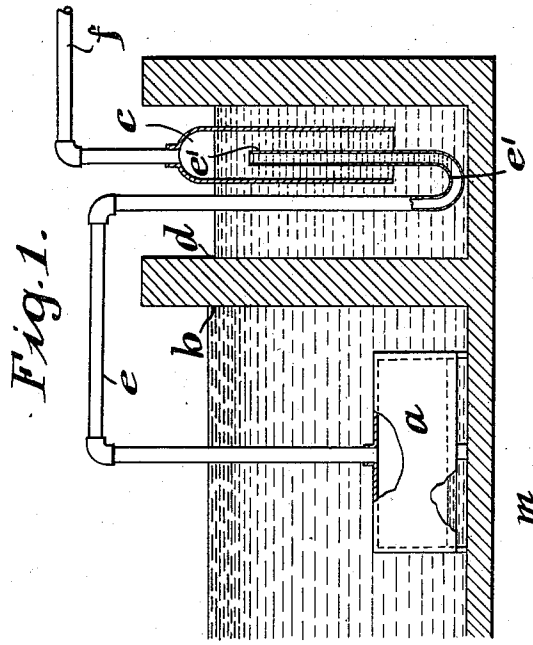

Fig. 1.

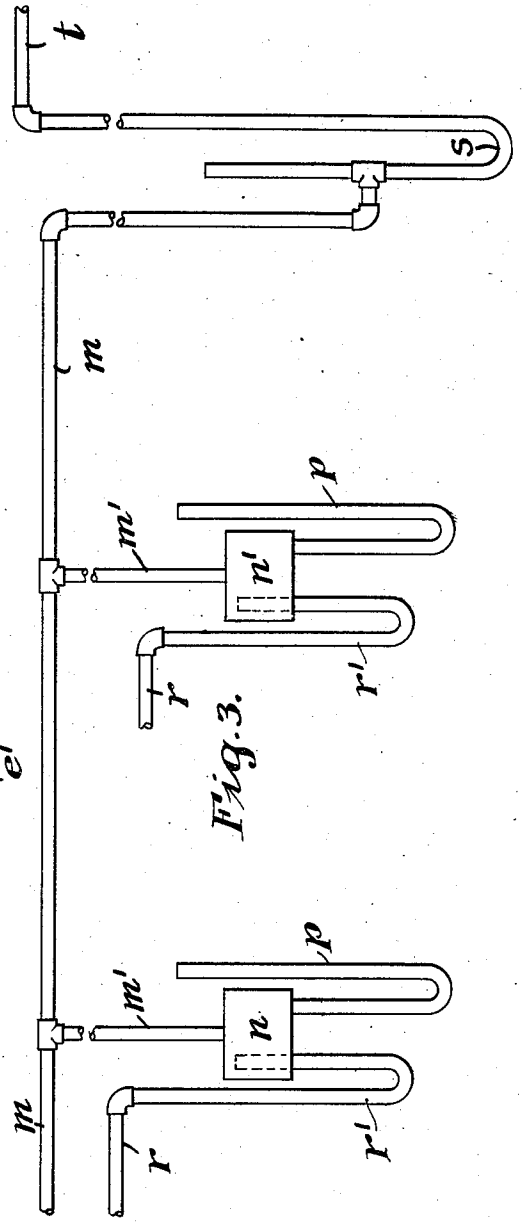

Fig. 3.

Witnesses

Daniel Webster, Jr.

A. M. Kelly.

Inventor

Hubert Beddoes

By Munn & Co.

Attorney

UNITED STATES PATENT OFFICE.

HUBERT BEDDOES, OF PHILADELPHIA, PENNSYLVANIA.

AIR-FLUSHING APPARATUS.

1,014,363. Specification of Letters Patent. Patented Jan. 9, 1912.

Application filed January 27, 1910. Serial No. 540,432.

To all whom it may concern:

Be it known that I, HUBERT BEDDOES, a citizen of the United States, and a resident of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Air-Flushing Apparatus, of which the following is a specification.

It has been usual to control air-locks and other air-controlled devices by forcing air directly into the air-lock or device from an air-bell by hydrostatic action. In such cases the air enters the device directly at a gradually increasing pressure. By means of the air-seal thus produced the flow of liquid may be controlled, and by breaking the air-seal the liquid may be flushed or caused to rush through a pipe, siphon or sluiceway. In such cases the water is automatically controlled and flushed by means of air.

By the present invention it is proposed to automatically control and flush air by means of water-seals, so that upon the breaking of the water seal a substantial volume of air may be flushed or caused to rush through an air-pipe or pipes to air-controlled devices. To this end I employ an air-pipe having a liquid-seal, a hydrostatically controlled pressure accumulator communicating with said pipe, a sealed receiver inclosing the liquid-seal, and a delivery pipe leading from such receiver. When the pressure in the accumulator is sufficient to force the liquid-seal in the air-pipe, the air will rush or be flushed through the air pipe into the receiver and may pass thence through the delivery pipe to the air controlled devices. By this means a sufficient volume of air may be flushed from a single hydrostatically controlled accumulator, such as an air-bell, to operate several separate and independent devices, the surplus air passing from one device to the next.

In the preferred form of my apparatus the hydrostatically controlled pressure accumulator consists of an air-bell of substantial area arranged to be submerged in liquid in a chamber, filter-bed, river or other place where the water or liquid may rise and fall; the receiver consists of a smaller air-bell, having its bottom submerged in liquid in a suitable chamber; the air-pipe leads from the upper part of the first air-bell and terminates in an upturned liquid-sealed end within the second or smaller air-bell, and the flushed air is discharged from the upper part of the second air-bell through the delivery pipe to the air-controlled devices. The strength of the air-seal, and consequently the amount of air that will be flushed, depends upon the strength of the liquid-seal in the air-pipe and the level of the liquid in which the second air-bell is submerged.

In the drawings, Figure 1 is a vertical sectional view of the hydrostatically controlled air-flushing devices; Fig. 2 is a similar view of devices which may be automatically controlled by the air flushed from the devices shown in Fig. 1; and Fig. 3 is a side elevation of other devices which may be controlled, either by the surplus air from the automatically controlled devices shown in Fig. 2, or directly by the air flushed from the devices shown in Fig. 1.

a is an air-bell of substantial area arranged in position to be submerged in water in any suitable chamber, tank or bed *b*.

c is an air-bell substantially smaller than the bell *a* submerged in water in a tank or chamber *d*.

e is an air-pipe leading from the air-bell *a* and having an upturned end *e'* extending up into the air-bell *c*.

f is an air-pipe leading from the air-bell *c*.

Normally a sufficient level of water is maintained in the chamber *d* to submerge the bottom of the bell *c* and seal the upturned end *e'* of the pipe *e*. The water-seal thus formed will have sufficient strength to hold back the air pressure in the bell *a* and pipe *e* up to a predetermined level of water in *b*; and that level will depend upon the level normally maintained in *c* and the strength of the water-seal in the pipe *e'*. As soon as the water in *b* has passed this level the pressure in the bell *a* and pipe *e* will be sufficient to expel the water contents of the seal *e'*. As the equilibrium of the air and water pressures is then upset the water will rise rapidly in the bell *a* and flush air therefrom through the pipe *e e'* into the bell *c*, whence it will pass through the pipe *f* and may be utilized to operate air-controlled devices for any purpose.

In Fig. 2 I have shown an air-locked ∩-shaped sluiceway *g* adapted to control the flow of liquid from *h* to *j*. The air-pipe *f* from the bell *c* has an upturned end *f'* entering one leg of the sluiceway *g*, so that the air admitted thereby, or a portion of it, may act to air-lock the sluiceway in the manner well known. As more air will usually be

flushed from the bell c than is required to air-lock the sluiceway g, the surplus may be supplied through an air pipe i leading from the crown of the sluiceway to the bottom of a submerged air-bell k from which an air-pipe m may lead to other air-controlled devices, such, *e. g.*, as the water receptacles n, n' and the release trap o, shown in Fig. 3. Such water receptacles n and n' are shown provided with U-shaped liquid seals p and with air pipes r having U-shaped ends r' entering the receptacles. These pipes r may lead from the top of siphons or air-controlled sluiceways. When air is forced from the pipe m through the branches m' into the receptacles n and n' and breaks the seals p, the pipes r, r, and the siphons or sluiceways which they control will be unsealed.

The release trap o as shown consists of a U-shaped water seal s having its short leg connected with the pipe m. The long leg may be connected by a pipe t with a sluiceway such as the sluiceway g shown in Fig. 2. When the air forced through the pipe m into the short leg of the seal s ejects the water therefrom, the pipe t will be unsealed and will release the air in the air-locked sluiceway (such as g) with which it connects. In Fig. 2 I have shown the sluiceway g provided with an air-pipe t' which may be understood as leading to a release-trap similar to the trap o.

While I have described the pipe f as leading to the sluiceway g, and the pipe m as leading from the bell k controlled from that sluiceway to the devices n, n' and o, it is apparent that the pipe f might lead directly to the devices n, n' and o, or, in fact to any devices which are to be controlled by air flushed from the apparatus shown in Fig. 1. The air-controlled devices operated by this flushed air which have been described are especially adapted for use in a system of sewage purification, such as is shown and described in application No. 531,804, filed December 7th, 1909, but in the present application I do not mean to limit my invention to any specific use of the means for flushing the air.

What I claim is as follows:

1. In apparatus for the purpose described, the combination of an air-bell arranged to be submerged in a variable column of liquid, an air-pipe leading from said bell and having a liquid-seal adapted to be forced by the accumulated air-pressure in said air-bell, a second bell of smaller area than the first normally sealed and having the liquid seal of the air-pipe from the first bell entering it, and a delivery-pipe for the flushed air leading from said second bell.

2. In apparatus for the purpose described, the combination of an air-bell arranged to be submerged in a variable column of liquid, a second bell normally sealed, an air-pipe leading from the first bell and terminating in a liquid-seal within the second bell, and a delivery-pipe for the flushed air leading from said second bell.

3. In apparatus for the purpose described, the combination of a bell arranged to be submerged in a variable column of liquid, a chamber containing a predetermined column of liquid, an air-bell submerged in the liquid in said chamber, an air-pipe leading from the first bell and terminating in an upturned end within the second bell and sealed by the liquid in said chamber, and an air-delivery pipe leading from said second bell.

4. In apparatus for the purpose described, the combination of an air-pipe having a liquid seal, a hydrostatically controlled pressure accumulator communicating with said air-pipe, a sealed receiver inclosing the liquid seal of said air-pipe, and a delivery-pipe for the flushed air leading from said receiver.

In testimony of which invention, I have hereunto set my hand.

HUBERT BEDDOES.

Witnesses:

ERNEST HOWARD HUNTER,

R. M. KELLY.