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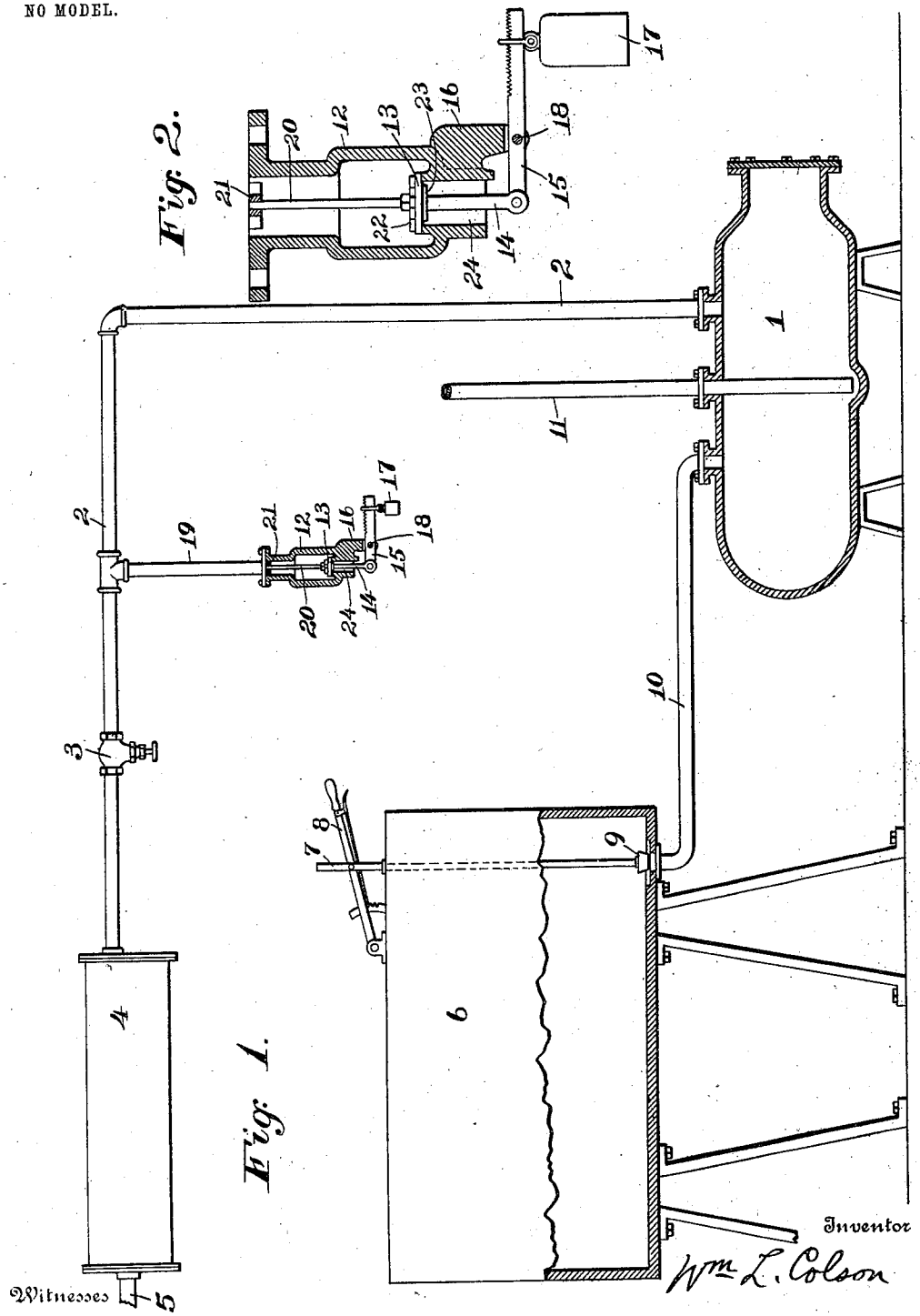
W. L. COLSON.

ACID OR OTHER LIQUID DISTRIBUTING SYSTEM.

APPLICATION FILED MAY 19, 1902.

NO MODEL.




Witnesses

Percy C. Bowen.

T. A. Buckhead.

Inventor

Wm. L. Colson

By Howson & Howson,

Attorneys

No. 728,084. Patented May 12, 1903.

# UNITED STATES PATENT OFFICE.

WILLIAM L. COLSON, OF SAVANNAH, GEORGIA, ASSIGNOR TO FRANK M. WEVER, OF SAVANNAH, GEORGIA.

## ACID OR OTHER LIQUID DISTRIBUTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 728,084, dated May 12, 1903.

Application filed May 19, 1902. Serial No. 108,015. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM L. COLSON, a citizen of the United States, and a resident of Savannah, Chatham county, State of Georgia, have invented certain new and useful Improvements in Acid or other Liquid Distributing Systems, of which the following is a specification.

My invention relates to air-vent valves for acid-distributing systems; and my object is to provide a valve for this purpose which will automatically operate to emit air from the system when the tank or other receptacle from which the acid is transferred from a lower to a higher level is to be supplied with the acid.

A further object is to provide a valve which will not be corroded by the acid and by which frequent repairs or renewals may be obviated.

In fertilizing plants it is customary to transfer the acid, such as sulfuric acid, from a reservoir to a tranfer-tank known as an "acid-egg" and to transfer or force the acid from the egg to a higher level by pressure of compressed air upon the liquid in the tank. In accomplishing this transfer of the acid from the acid-egg to a higher level a hand-operated globe-valve closing an air-vent for reducing the air-pressure in the system has been employed, thereby necessitating the opening of this valve by hand to permit the escape of the air from the egg. In the escape of the air in order to reduce the air-pressure sufficiently to permit the filling of the egg from the reservoir a quantity of entrained acid is carried into contact with the valve and the seat, resulting in the rapid deterioration of the same owing to the corrosive action of acid, thereby requiring frequent renewals. My invention overcomes these objections, first, by the provision of an automatically-operated air-valve, which will immediately close upon the admission of pressure to the pipe leading to the acid-egg and will remain closed so long as pressure sufficiently high is maintained therein for the transfer of the acid from the egg to a higher level or to any point desired, but will immediately open after the said liquid acid has been transferred and the air-pressure cut off, thereby permitting the escape of the air and reducing the pressure sufficiently to permit the ready flow of acid to the egg from the reservoir, and, second, by the use of a valve structure of such material as will not be affected by the acid.

With these objects in view my invention consists in the novel construction and details thereof, as hereinafter described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the drawings, Figure 1 is a diagrammatic view, partly in section, showing the application of my invention to an acid-transfer apparatus of a fertilizing plant; and Fig. 2 is an enlarged sectional detail of the valve.

Referring to the drawings, in which the same reference characters relate to the same or corresponding parts in both views, the numeral 1 indicates a cast-iron receptacle suitably lined with some acid-resisting material, such as lead, and generally known as the "acid-egg." From this egg or tank a pipe 2 leads to an air receiver or cylinder 4 in communication, by means of a pipe 5, with any suitable form of air-compressor. This acid-egg is also connected, by means of the pipe 10, to the bottom of an acid-supply tank or reservoir, also lined with lead or equivalent material. The opening to the pipe 10 is closed by a valve 9, carried by a stem 7, which may be raised and lowered in any suitable manner, such as by means of a handle 8. The tank 6 is preferably at a higher level than the tank 1, so that by opening the valve 9 the acid may flow by gravity from the tank 6 into the acid-egg 1. Communication between the compressed-air receiver or cylinder 4 and the transfer-tank 1 is controlled by an ordinary globe-valve 3.

Extending from the acid-egg and preferably opening near the bottom thereof is a pipe 11, through which the acid is transferred from the tank and distributed to a higher level or to the point desired. By opening the valve 3 communication is established between the acid-egg and the compressed-air reservoir, so that pressure of the compressed air is exerted upon the liquid acid in the egg, thereby forcing said liquid out through the pipe 11 to the point desired. The valve 9, of course, in the tank 6 is closed while this transfer is taking place. After the acid-egg is emptied a

further charge of acid must be transferred from the tank 6 to the said egg, and in order to accomplish this transfer it is necessary that the air-pressure within the system embodying the pipe 2, the egg 1, and the pipe 10 must be reduced. To accomplish this reduction, I provide at a suitable point in the pipe 2 a valve for automatically permitting the escape of air from the said system. In the drawings I have shown a branch air-vent pipe 19 extending downwardly from the pipe 2. To this pipe I attach a valve-casing 12, in the lower portion of which is formed a valve-seat upon which the disk valve 13 is adapted to seat and close the air-outlet 24. A stem 14 extends downwardly from the valve and is pivotally connected with a lever 15, fulcrumed upon a suitable fixed part—such as a lug 16, extending downwardly from the casing, through which the fulcrum-pin 18 passes. An adjustable weight 17 is mounted upon the lever, by means of which the valve is normally held open and may be regulated to open at a predetermined pressure. This adjustment of the weight is governed by the air-pressure used in the system, the valve being so adjusted that it will automatically open when air-pressure is shut off from the egg, whereupon it falls below the pressure at which the valve is held closed against the action of the weight. The valve, its seat, and casing are preferably made of a material which will resist the corrosive action of acid, such as an alloy of antimony and lead, and the valve itself has a disk of rubber confined between suitable washers 22 and 23, of the acid-resisting material. Extending upwardly from the valve-disk is a guide-rod 20, confined by any suitable guiding means, such as a spider 21, fixed to the casing 12 or to the vent-pipe 19.

From the foregoing it is obvious that after the acid has been emptied by the compressed air admitted through the pipe 2 the globe-valve 3 is closed, thereby shutting off communication between the compressed-air receiver and the egg, and thus confining a body of compressed air within the pipe 2, the egg 1, and the pipes 10 and 11, and in order to refill the egg it is necessary, as already indicated, that this pressure be reduced. The moment, therefore, that the valve 3 is closed and the compressed air is completing the transfer of the acid from the egg 1 to the upper level or to the point desired the pressure of the air in the tank will be lowered by its expansion, and hence when it reaches the point at which the valve is opened, so as to permit the weight 17 to lift the valve, the air will escape, thereby relieving the acid-egg of the pressure which otherwise would prevent ready flow of acid to the egg from the tank 6. When the valve 3 is opened, compressed air passes at once into the air-vent pipe and through the pipe 2 to the egg, and by the time it has reached the egg its pressure has automatically closed the valve 13, which remains closed during the transfer of acid from the egg to the desired point.

While my invention is especially applicable to acid-distributing systems, it may be used in other liquid-distributing systems without departing from the scope of the invention.

I claim as my invention—

1. In an acid or other liquid distributing system, the combination with a compressed-air-supply pipe, an acid or other liquid transfer tank into which the compressed air is admitted through said pipe to force the liquid therefrom, of an air-vent communicating with the compressed-air-supply pipe, a valve automatically operated by the pressure of air to close the vent in said air-supply pipe when compressed air is admitted through said supply-pipe to the tank and to open said vent when the said air-pressure is cut off, and an acid or liquid supply tank or reservoir communicating with said tank, substantially as described.

2. In an acid or other liquid distributing system, the combination with an acid or other liquid transfer tank, a compressed-air-supply pipe communicating therewith, an acid or other liquid reservoir having a valved communication with the transfer-tank, and a distributing-pipe leading from the transfer-tank, of an air-vent-valve casing communicating with the said supply-pipe, and a valve automatically operated by the pressure of air to close the vent when air-pressure is admitted through said supply-pipe to the transfer-tank and to open said vent when said air-pressure is cut off, substantially as described.

3. In an acid or other liquid distributing system, the combination with an acid or other liquid transfer tank, a compressed-air-supply pipe communicating therewith, means for controlling the admission of compressed air to the said tank, of an air-vent valve automatically operated by the reduction of air-pressure in said supply-pipe for permitting the air to escape from said tank when the air-supply is cut off, and an acid or other liquid reservoir connected to said tank for supplying acid or other liquid thereto, substantially as described.

4. In an acid-distributing system, the combination with an acid-transfer tank, of a distributing-pipe for discharging acid therefrom, a compressed-air-supply pipe for admitting compressed air to said transfer-tank to force the acid through said distributing-tank, an air-vent communicating with the air-supply pipe, and a valve formed of acid-resisting material closing said vent, with means depending solely upon the pressure of air in the supply-pipe for closing said valve, substantially as described.

5. In an acid or other liquid distributing system, the combination with an acid or other liquid-supply reservoir, a transfer-tank having a valved communication therewith, a pipe leading from said transfer-tank to the point of distribution, a valved compressed-air-sup-

ply pipe communicating with the top portion of the transfer-tank, of an air-vent communicating with said compressed-air-supply pipe, a normally open valve controlling said air-vent, said valve being closed by the air-pressure in the supply-pipe when the latter is open to the transfer-tank, substantially as described.

6. In an acid or other liquid distributing system, the combination with an acid or other liquid transfer tank, a pipe for transferring acid therefrom, a compressed-air-supply pipe for said tank, of an air-vent in said system, and a valve controlling said vent and normally opening the same when the pressure in the system is below a predetermined point but automatically closing said vent when the pressure is admitted to the tank for transferring the acid therefrom, substantially as described.

7. In an acid or other liquid distributing system, the combination with an acid or other liquid transfer tank, means for supplying liquid thereto, a pipe communicating with said tank for transferring liquid therefrom, and a compressed-air-supply pipe communicating with said tank for admitting compressed air thereto, of an air-vent pipe communicating with said supply-pipe, a weighted valve normally held open and arranged to automatically close the vent when compressed air of a predetermined pressure is admitted to the pipe, substantially as described.

8. In an acid or other liquid distributing system, the combination with a transfer-tank from which liquid is transferred to the point desired, a compressed-air-supply pipe for admitting compressed air to the said tank, a valve controlling the supply of compressed air through said pipe, a reservoir for supplying liquid to said tank, and a valve automatically operated by the air admitted to the said supply-pipe adapted to permit the escape of air from the tank when the compressed-air supply is cut off and to prevent escape of such air when the compressed air is admitted to the tank, substantially as described.

9. In an acid-distributing system, the combination with the transfer-tank, the compressed-air-supply pipe communicating therewith, of an air-vent valve operated by the direct pressure of air in the supply-pipe for closing the pipe against escape of air when pressure is admitted to the tank and for opening said vent when said pressure is cut off, said valve structure being composed of an acid-resisting material, substantially as described.

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

WILLIAM L. COLSON.

Witnesses:
R. M. LARCOMBE,
M. P. RIVERS.