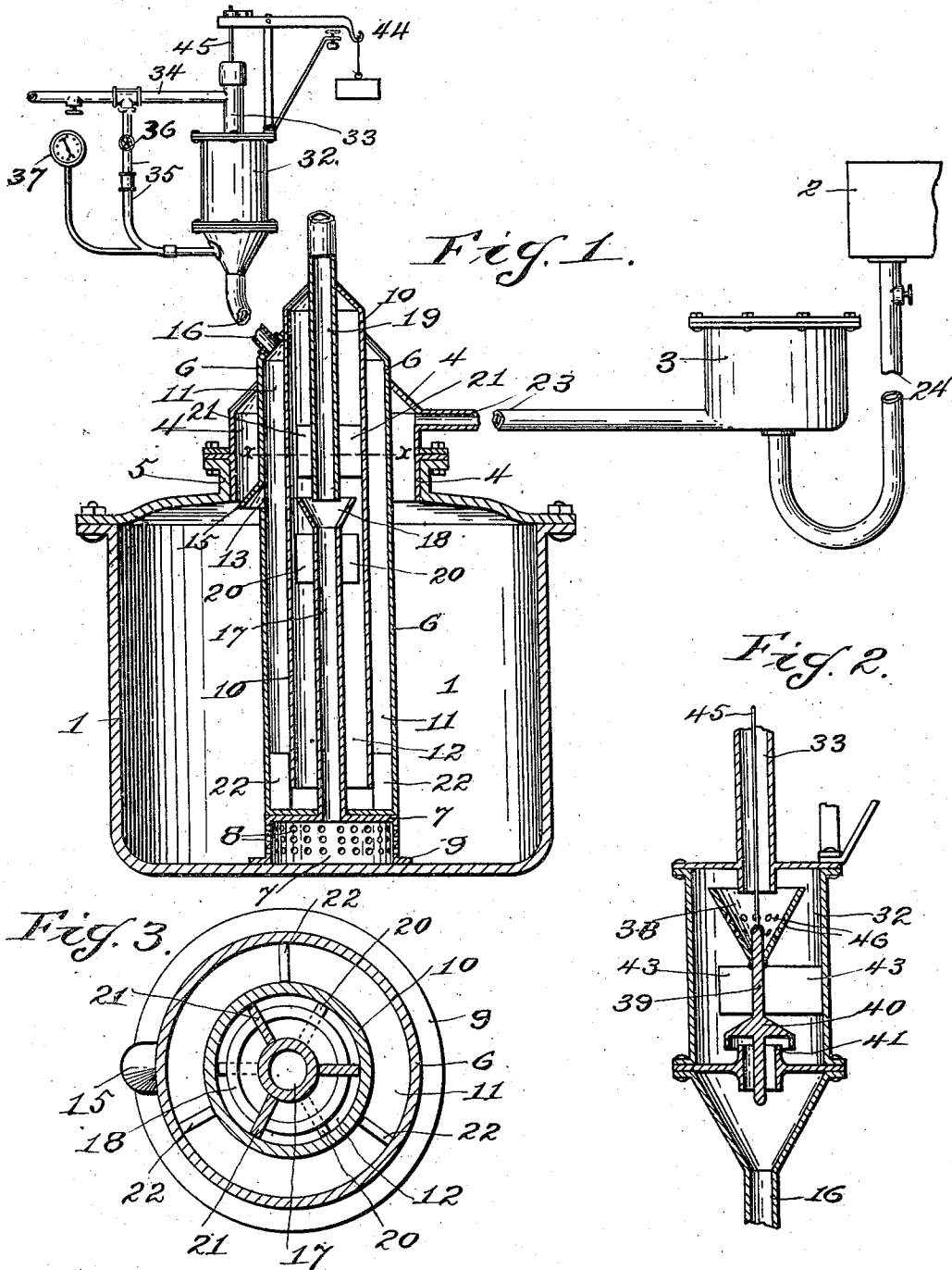


A. LONG.
 AUTOMATIC CHEMICAL AIR LIFT.
 APPLICATION FILED MAY 9, 1912.

1,045,157.

Patented Nov. 26, 1912.
 2 SHEETS—SHEET 1.



Witnesses:

Wm. C. Volk Jr.
 C. T. Bell

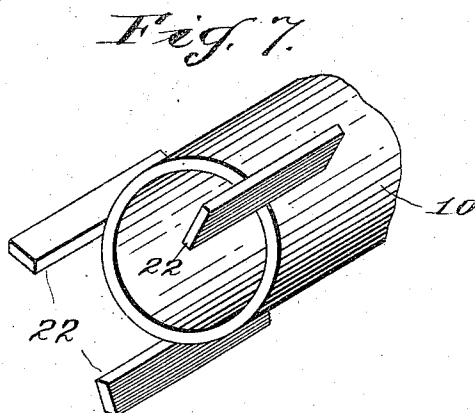
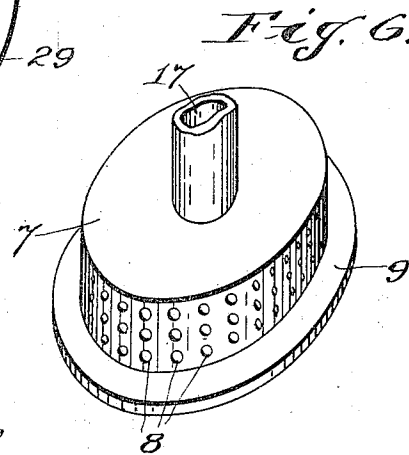
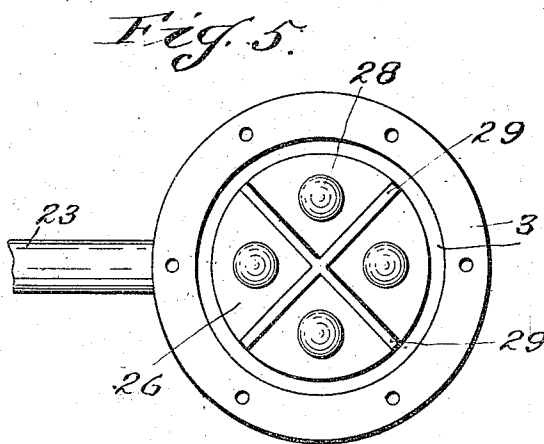
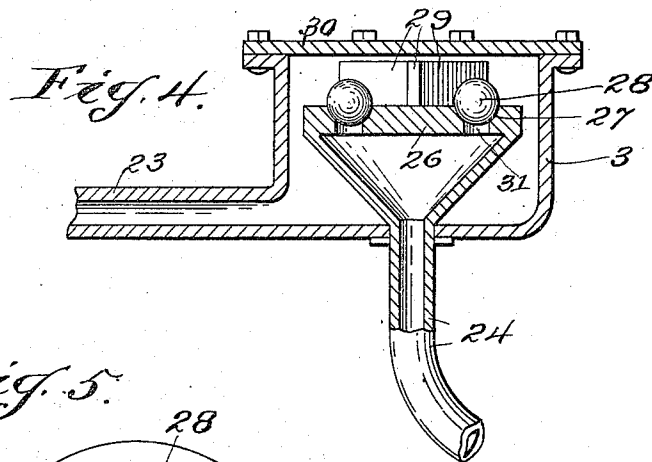
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Witnesses:

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UNITED STATES PATENT OFFICE.

AUGUST LONG, OF BAYONNE, NEW JERSEY.

AUTOMATIC CHEMICAL AIR-LIFT.

1,045,157.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed May 9, 1912. Serial No. 696,224.

To all whom it may concern:

Be it known that I, AUGUST LONG, a citizen of the United States, residing at Bayonne, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Automatic Chemical Air-Lifts, of which the following is a specification.

This invention relates to apparatus for raising liquid by compressed air, and pertains especially to such apparatus as covered by my Patents No. 979,867, dated December 27—1910, and No. 987,729 dated March 28—1911.

The object of this invention is to provide certain improvements on or in connection with my said Patent No. 979,867, whereby I accomplish improved results in the operation of the apparatus.

In carrying out the improved apparatus I dispense with certain elements or features of the apparatus disclosed by my Patent No. 979,867, without altering the essential features, or the operative principle thereof, but in the practical working of such apparatus I have found that the changes and improvements hereinafter set forth are of great advantage and of vital importance in perfecting the apparatus and in attaining better results.

With these purposes in view the invention consists in the novel construction, combination and arrangement of parts, as will be hereinafter fully described and set up in the claims.

In the accompanying drawings forming part of this application:—Figure 1— is a sectional elevation partly broken away. Fig. 2— is a detail vertical sectional view of the air-feed valve and its cylinder. Fig. 3— is an enlarged cross section taken on the dotted line $x-x$ Fig. 1. Fig. 4— is a detail vertical section of the liquid feed valve and its casing. Fig. 5— is a top view of the liquid feed valve and its casing with the top of the casing removed. Fig. 6— is a detail perspective view of the supporting base. Fig. 7 is a perspective view of one end of the cylinder.

The same reference characters denote the same parts throughout the several views of the drawings.

A reservoir 1, a storage tank 2, and a chemical or liquid feed valve inclosed within a casing 3, are employed for carrying out the invention, and the casing 3 is connected

with a hood 4, attached to an annular projection 5 fitting the central portion of the top of the reservoir and opening thereinto.

An outer casing 6 extends through the hood 4 into the reservoir 1, and has a conical closed top and a closed bottom supported by a cylindrical base 7 having apertures 8, for the passage of liquid, and a base rim 9 seated on the bottom of the reservoir 1. A cylinder or pipe 10, having a closed end extending through the top of the casing 6, and having an open end adjacent the bottom of the casing so as to leave an air passage from the air chamber 11 to the air chamber 12. An air vent or orifice 13 is made in the casing or cylinder 6 for the passage of air from the chamber 11 to the reservoir 1. A deflector 15, overhangs the orifice for the purpose of directing the air downwardly as it enters the reservoir 1. A pipe 16 is attached to the top of the cylinder 6, for supplying air to the chamber 11, or said pipe may be attached to the top of the hood 4, and accomplish the same purpose or result. A liquid lift pipe 17, opens through and extends from the bottom of the casing 6 and the top of the supporting base 7, and terminates in a flaring mouth 18, substantially and preferably opposite the orifice 13. A liquid lift or discharge pipe 19 extends from the pipe mouth 18 through the top of the cylinder 10, and may be connected with a pipe for conveying the chemical liquid as desired. The pipes 17 and 19 are provided with lateral wings 20 or ribs 20 and 21 respectively which engage the cylinder 10 for centralizing the said pipes, and the cylinder 10, is provided with like wings or ribs 22, which rest on the bottom of the casing 6 and engage the sides of the casing for centralizing the cylinder.

It is essential that the casing cylinder and pipes contained therein be maintained in centralized position, and such permanent centralization is best accomplished and maintained by means of the wings above referred to.

The casing 3 is connected with the hood 4 by a pipe 23 leading from the bottom of the casing for discharging liquid into the reservoir 1. Said casing contains the funnel-shaped end of a pipe 24, which is connected with the liquid storage or supply tank 2. The said funnel-shaped pipe-end is located on a plane above the pipe 23, and is provided with a head 26 having a plurality of valve-seats 27, for ball-valves 28,

which are separated by vanes or cross-plates 29 projecting from the face of the head 26. It will be observed that the head 26 is in such a position as to hold the plates 29 in close proximity to the top 30, of the casing 3, and that there is an annular space between the head 26 and the casing for the passage of liquid without permitting the ball 28 to pass therethrough. This arrangement affords means for limiting the lateral movement of the balls when they are raised by the pressure of the liquid in the pipe 24, and affords ample space for the vertical movement of the balls in opening and closing the valve-ports 31.

The pipe 16 connects the air chamber 11 with a valve cylinder 32 having a leading-in pipe 33 connected with an air supply pipe 34, which has coupled to it a relief pipe 35 provided with a valve 36 and connected with the funnel end of the pipe 16. The pipe 35 is provided with an air passage gage 37. The pipe 33 projects into the cylinder 32, and discharges into a funnel-shaped head 38 of a valve-stem 39 having a valve 40 co-operating with a valve-seat 41. The valve-stem 39 is provided with lateral vanes 43 which engage the side of the cylinder 32, for centralizing the stem, and the latter is connected with a valve adjusting device 44, by means of a rod 45. The funnel-head 38, forms an unusual surface for the action of air pressure thereon and thereby insures the closing of the valve 40. In order to overcome undue air pressure on the funnel-head such head is provided with a plurality of air-vents 46 to permit the escape of air through the funnel into the cylinder 32.

The above described valve mechanism and connections constitute the essential features of this invention, for by reason of the same I am enabled to furnish an automatic valve operation and to automatically control the air pressure to the apparatus more perfectly than by any other means known to me.

In starting the apparatus preparatory to its liquid lifting operations, the valve 40 being closed, a small or requisite amount of air is introduced into the top of the chamber 11, by means of the valve 36, and the air passes from said chamber into the chamber 12, to the pipe 19; during the flow of liquid by its own gravity from the storage tank 2, through the liquid check valve to the reservoir the latter will fill to the height of the vent 13, and during such filling, the liquid is prevented from flowing through the vent by means of the deflector 15; as the reservoir fills with liquid, air in the reservoir escapes through the vent 13 to the pipe 19 by way of the chambers 11 and 12, and when the liquid rises in the reservoir to the height of said vent it flows through the vent into the chambers 11 and 12 to the height

of the mouth 18 and excludes air pressure from the reservoir; whereupon the back pressure of air forming in the reservoir will gradually force the liquid through the base apertures 8, into the pipes 17 and 19, and such back pressure together with the valve-weight 44 will open the valve 40. Simultaneously with reservoir 1 and the chambers 11 and 12 becoming exhausted of liquid, the increasing velocity of air pressure on the funnel 38 will overcome the said valve weight and close the valve 40, the valve 36, remaining open sufficiently to automatically continue the lifting operations.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a liquid lifting apparatus, the combination with a reservoir, means for supplying the same with liquid, means in the reservoir for circulating air and liquid therethrough, and an air supply pipe, of an air-operated valve connected with the apparatus, a perforated cone attached to the stem of said valve and receiving air pressure for closing said valve, an air pipe leading from the air supply pipe and connected with the apparatus between the latter and the said air operated valve, and a valve in the said air pipe for admitting air to the apparatus independent of said air-operated valve.

2. The combination with a liquid lifting apparatus, of an air cylinder connected with the apparatus and having a valve seat therein, an air supply pipe connected with the cylinder above the seat, an air-operated valve coöperating with the seat, and a perforated cone mounted on the stem of the valve to receive the air discharged from said pipe for closing said valve.

3. The combination with a liquid lifting apparatus, of an air cylinder connected with the apparatus and having a valve seat therein, an air supply pipe connected with the cylinder above the seat, an air-operated valve coöperating with the seat, a perforated cone mounted on the stem of the valve to receive the air discharge from said pipe for closing said valve, an air pipe connecting the air supply pipe with the cylinder below the said valve, and a valve in the said air pipe between the supply pipe and the cylinder.

4. The combination with a liquid lifting apparatus, of an air cylinder connected with the apparatus and having a valve seat therein, an air supply pipe connected with the cylinder above the seat, an air-operated valve coöperating with the seat, a perforated cone mounted on the stem of the valve to receive the air discharged from said pipe for closing said valve, an air pipe connecting the air supply pipe with the cylinder below the said valve, a valve in the said air

pipe between the supply pipe and the cylinder, and a gage pipe branched from the air pipe for indicating air pressure in the apparatus.

5 5. In a chemical liquid lifting apparatus, the combination, with a reservoir supplied with such liquid by its own gravity, of a plurality of telescoping pipes projecting
10 into and out of the reservoir, a casing inclosing the pipes and having one of them sealed to an opening through the bottom of the casing, wings for centralizing the pipes
15 with the casing, a vent in the casing adjacent the top of the reservoir, an air-operated valve connected with the casing and

automatically opened upon the liquid reaching the said vent, a perforated air-funnel projecting from the stem of said valve to receive air pressure for closing the valve, and a base for supporting the casing and the pipes and having perforations in communication only with the innermost pipe of said plurality of pipes for inducting liquid from the reservoir into said innermost pipe.
In testimony whereof I affix my signature 25 in presence of two witnesses.

AUGUST LONG.

Witnesses:

RICHARD L. READ,
CHAS. WACHSMUTH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."