

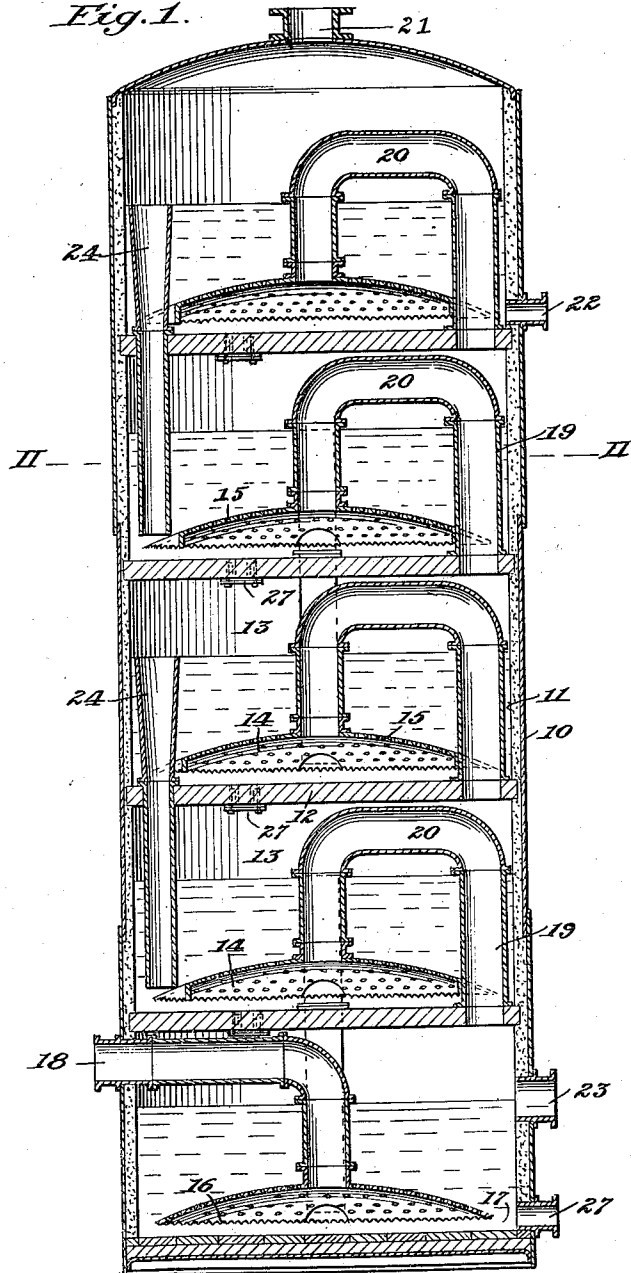
P. A. PAULSON.
ACID ABSORBING APPARATUS.
APPLICATION FILED MAY 11, 1915.

1,165,281.

Patented Dec. 21, 1915.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor:

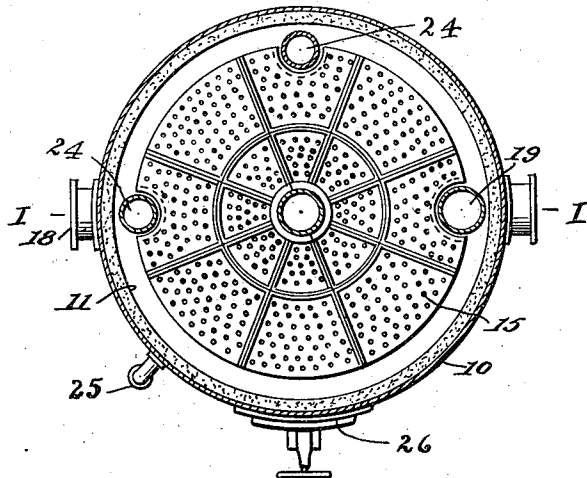
Peter A. Paulson,
By *Byras, Townsend & Bickelstein*
Att'ys.

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2 SHEETS—SHEET 2.

Fig. 2.



Inventor:

Peter A. Paulson

By *Bymes, Townsend & Buelowsten*
Att'ys.

UNITED STATES PATENT OFFICE.

PETER A. PAULSON, OF APPLETON, WISCONSIN.

ACID-ABSORBING APPARATUS.

1,165,281.

Specification of Letters Patent.

Patented Dec. 21, 1915.

Application filed May 11, 1915. Serial No. 27,332.

To all whom it may concern:

Be it known that I, PETER A. PAULSON, a citizen of the United States, residing at Appleton, in the county of Outagamie and State of Wisconsin, have invented certain new and useful Improvements in Acid-Absorbing Apparatus, of which the following is a specification.

This invention relates to acid-absorbing apparatus, and particularly to towers for the preparation of calcium bisulfite solutions and for like purposes.

It is well known that recent practice in the preparation of calcium bisulfite solutions requires that these solutions should be substantially saturated with uncombined sulfurous acid. Inasmuch as it has not proven practicable in the past to prepare such solutions in a single operation, it is customary to complete the saturation of the solutions in a supplementary device known as the auxiliary tower.

The apparatus hereinafter described is capable of delivering the bisulfite solution at the required degree of saturation, and recourse to an auxiliary tower or equivalent device is therefore unnecessary. This results in a material saving in the initial cost of installation, in floor space, and in operating expenses.

Furthermore, the present apparatus is capable of sustained operation for long periods without clogging, requiring at the most a weekly cleaning; and it is not dependent upon the gas-pressure to retain the proper depth of liquid in each compartment.

The apparatus also possesses other structural and operating advantages as will hereinafter appear.

The preferred construction is illustrated in the accompanying drawings, wherein—

Figure 1 is a central vertical sectional view, on line I—I of Fig. 2 of an absorbing tower embodying the invention; and Fig. 2 is a horizontal section thereof on line II—II of Fig. 1.

In said drawings, 10 represents a cylindrical steel shell, internally lined with acid-proof tile or other suitable material 11, and subdivided by horizontal partitions 12 into superposed absorbing chambers or compartments 13. Five such compartments are illustrated, but it will be understood that a larger or a smaller number may be provided according to the operating conditions. A gas-distributor 14 is arranged in each cham-

ber. In their preferred form, these distributors are shallow stoneware spreaders of even curvature, which may be of sectional construction, and have an axial connection with the respective gas-conduits. They are preferably uniformly perforated over their entire area, as indicated at 15, and are likewise serrated at the periphery 16. The gas-distributors are disposed wholly below the liquid level, and slightly above and parallel to the partitions 12. They extend over nearly the entire floor area of the respective compartments, leaving however an ample peripheral gas-channel 17, which serves as a safety-passageway for the gases in case of the clogging of some or all of the perforations 15.

The gases enter the lowermost compartment at 18, and after bubbling evenly through the entire body of liquid therein the unabsorbed gas flows through the conduit 19 to the axis of the distributor 14 in the compartment next above, and so on upwardly, the residual gases escaping from the uppermost compartment at 21. Each conduit 19 is in the form of an inverted U, the reflexed portion 20 of which is located in the gas space of the compartment.

The milk of lime is supplied continuously to the upper compartment at 22 and flows downwardly through the tower, the fully saturated bisulfate solution finally overflowing from the lowermost compartment at 23. Each compartment is provided with a fixed overflow 24, located at a level between the gas-spreader 14 and the reflected portion 20 of the gas-conduit leading thereto, and delivering into the lower portion of the compartment next below. This construction insures a sufficient depth of liquid in each compartment irrespective of any variations in the gas-pressure.

Each compartment is fitted with a suitable level-indicator 25 (Fig. 2) and with a man-hole 26 of sufficient size to permit removal and replacement of the sectional portions of the interior fittings. Washout openings 27, which are of course closed in normal operation, are provided in connection with each compartment.

In the preparation of bisulfite solutions certain well-known difficulties are encountered. The dissolved and suspended lime introduced at the upper portion of the tower is transformed progressively into calcium mono-sulfite and calcium bisulfite, the forma-

tion of the mono-sulfite occurring in the upper chambers only, where it has a strong tendency to deposit. In its downward passage the mono-sulfite is converted into bisulfite, but in the lower compartments of the tower considerable quantities of free sulfur and of sulfur trioxid are encountered in association with the sulfur dioxid. The sulfur trioxid reacts with the bisulfite to form calcium sulfate which tends to deposit in thin scales upon everything with which it comes in contact; and the free sulfur likewise tends to deposit in such manner as to obstruct all gas-passages. It will readily be understood that under these conditions it is imperative that there should be no quiescent bodies of liquid in the apparatus, as these would permit the accumulation of deposited matter, quickly clogging the tower. In case the apertures of the gas-distributers eventually become clogged a corresponding proportion of the gas escapes around the serrated periphery, thus maintaining, even under adverse conditions, a free passage for the gas and a reasonably effective absorption of the sulfur dioxid. As above stated, the efficiency of the apparatus is such that it has been found practicable to produce calcium bisulfite solutions completely saturated with uncombined sulfurous acid without recourse to the usual auxiliary tower or to any equivalent supplemental absorbing device.

I claim:—

1. In apparatus for preparing bisulfite solutions or like purposes, a series of superposed chambers constituting a tower, an arched gas-distributer supported in proximity to the bottom of each chamber and extending nearly to the walls thereof, a reflexed gas-conduit extending from the peripheral portion of each chamber to the gas-distributer in the chamber next above, and an acid overflow in each chamber located at a level intermediate the gas-distributer and the reflexed portion of the gas-conduit, and discharging into the chamber next below.

2. In apparatus for preparing bisulfite so-

lutions or like purposes, a series of superposed chambers constituting a tower, an arched gas-distributer supported in proximity to the bottom of each chamber and extending nearly to the walls thereof, said gas-distributer having a serrated periphery, a reflexed gas-conduit extending from the peripheral portion of each chamber to the gas-distributer in the chamber next above, and an acid overflow in each chamber located at a level intermediate the gas-distributer and the reflexed portion of the gas-conduit, and discharging into the chamber next below.

3. In apparatus for preparing bisulfite solutions or like purposes, a series of superposed chambers constituting a tower, an arched perforated gas-distributer supported in proximity to the bottom of each chamber and extending nearly to the walls thereof, a reflexed gas-conduit extending from each chamber to the gas-distributer in the chamber next above, and an acid overflow in each chamber located at a level intermediate the gas-distributer and the reflexed portion of the gas-conduit, and discharging into the chamber next below.

4. In apparatus for preparing bisulfite solutions or like purposes, a series of superposed chambers constituting a tower, an arched perforated gas-distributer supported in proximity to the bottom of each chamber and extending nearly to the walls thereof, said gas-distributer having a serrated periphery, a reflexed gas-conduit extending from each chamber to the gas-distributer in the chamber next above, and an acid overflow in each chamber located at a level intermediate the gas-distributer and the reflexed portion of the gas-conduit, and discharging into the chamber next below.

In testimony whereof I affix my signature in presence of two witnesses.

PETER A. PAULSON.

Witnesses:

JOSEPH SANDHOFER,
M. J. SIMON.

It is hereby certified that in Letters Patent No. 1,165,281, granted December 21, 1915, upon the application of Peter A. Paulson, of Appleton, Wisconsin, for an improvement in "Acid-Absorbing Apparatus," errors appear in the printed specification requiring correction as follows: Page 1, line 88, for the word "bisulfate" read *bisulfite*; same page, line 92, for the word "reflected" read *reflexed*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of June, A. D., 1917.

[SEAL.]

F. W. H. CLAY,

Acting Commissioner of Patents.