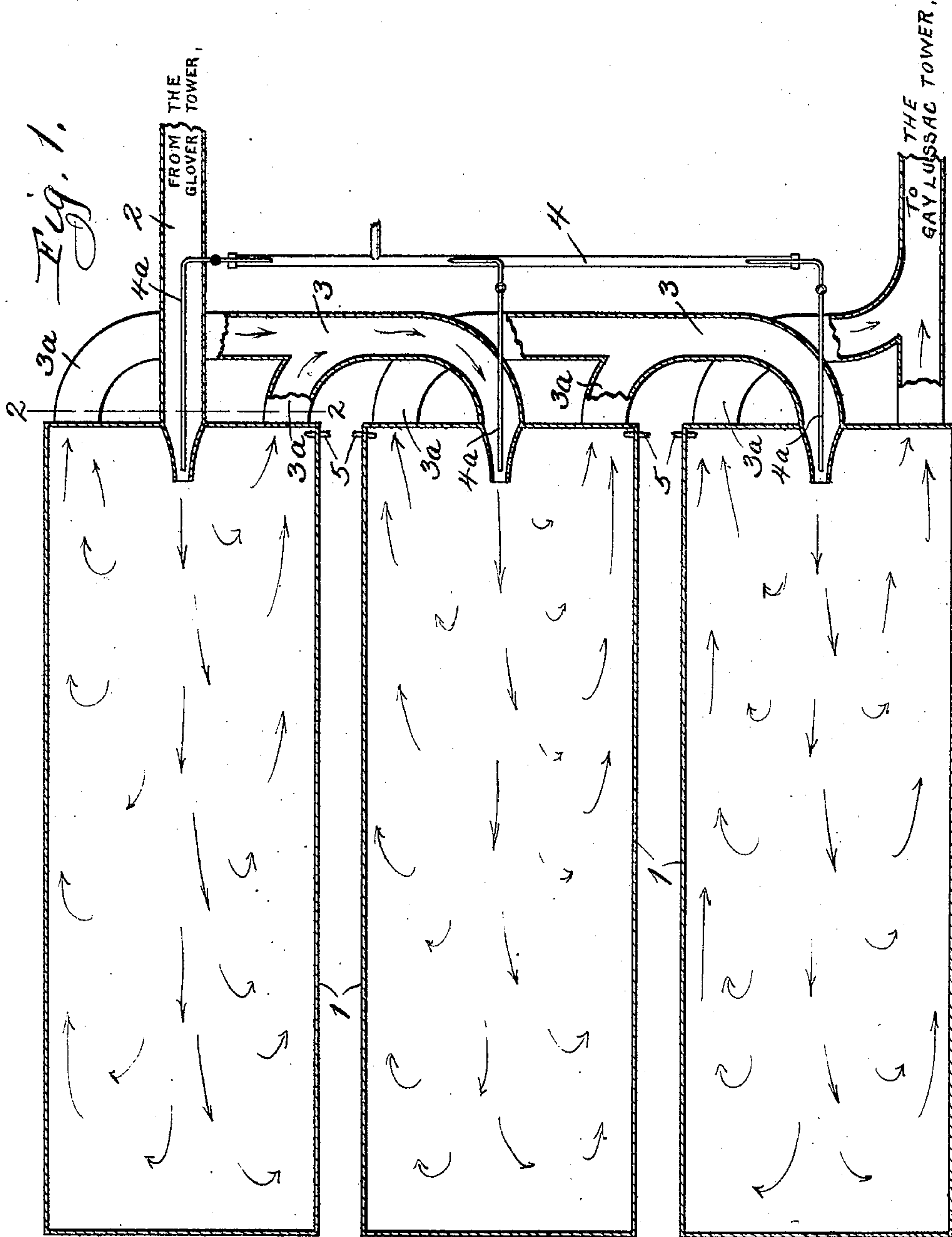


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PATENTED JULY 23, 1907.

O. H. ELIEL.  
SULFURIC ACID CHAMBER.  
APPLICATION FILED MAR. 8, 1906.

2 SHEETS—SHEET 1.



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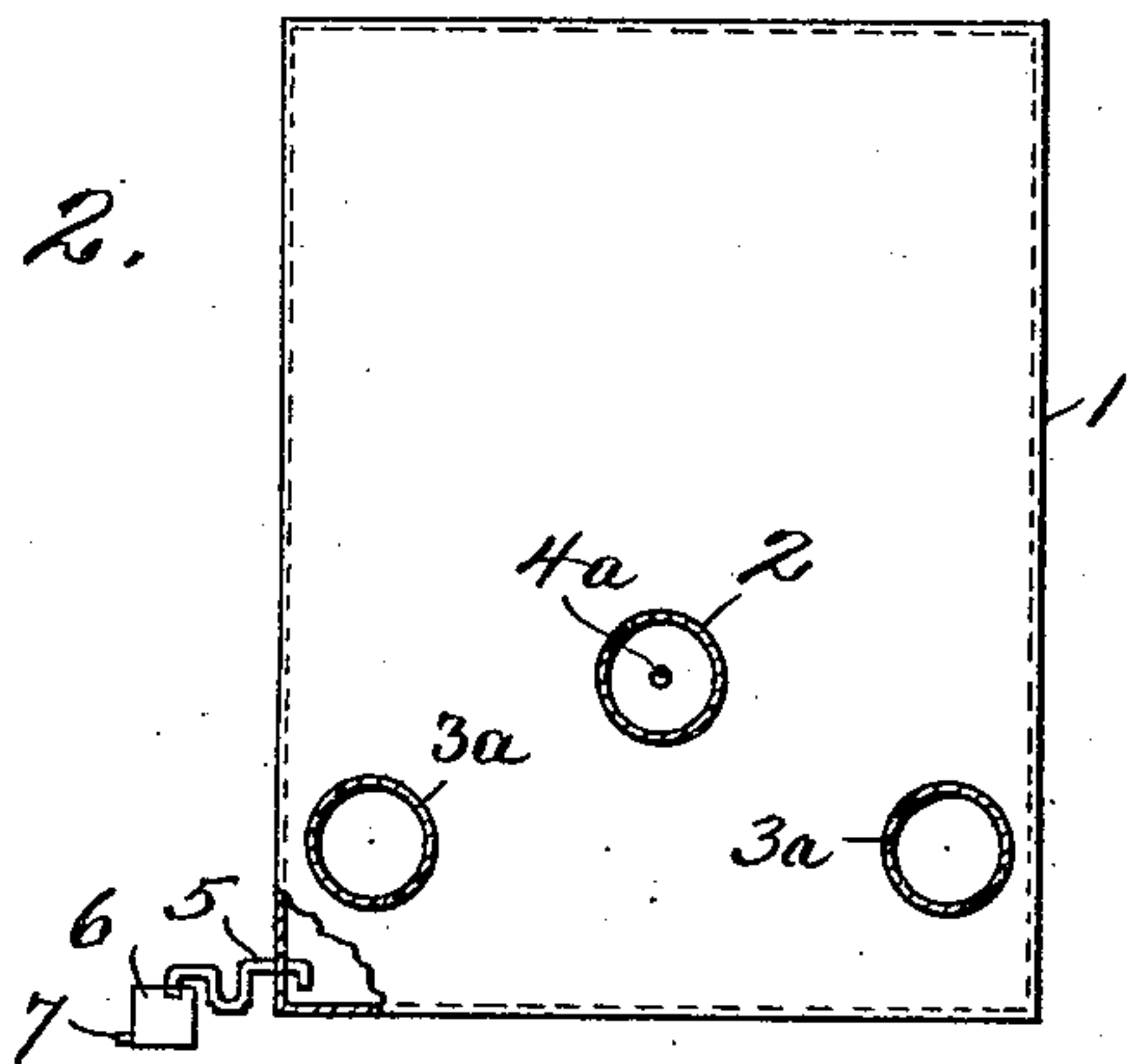
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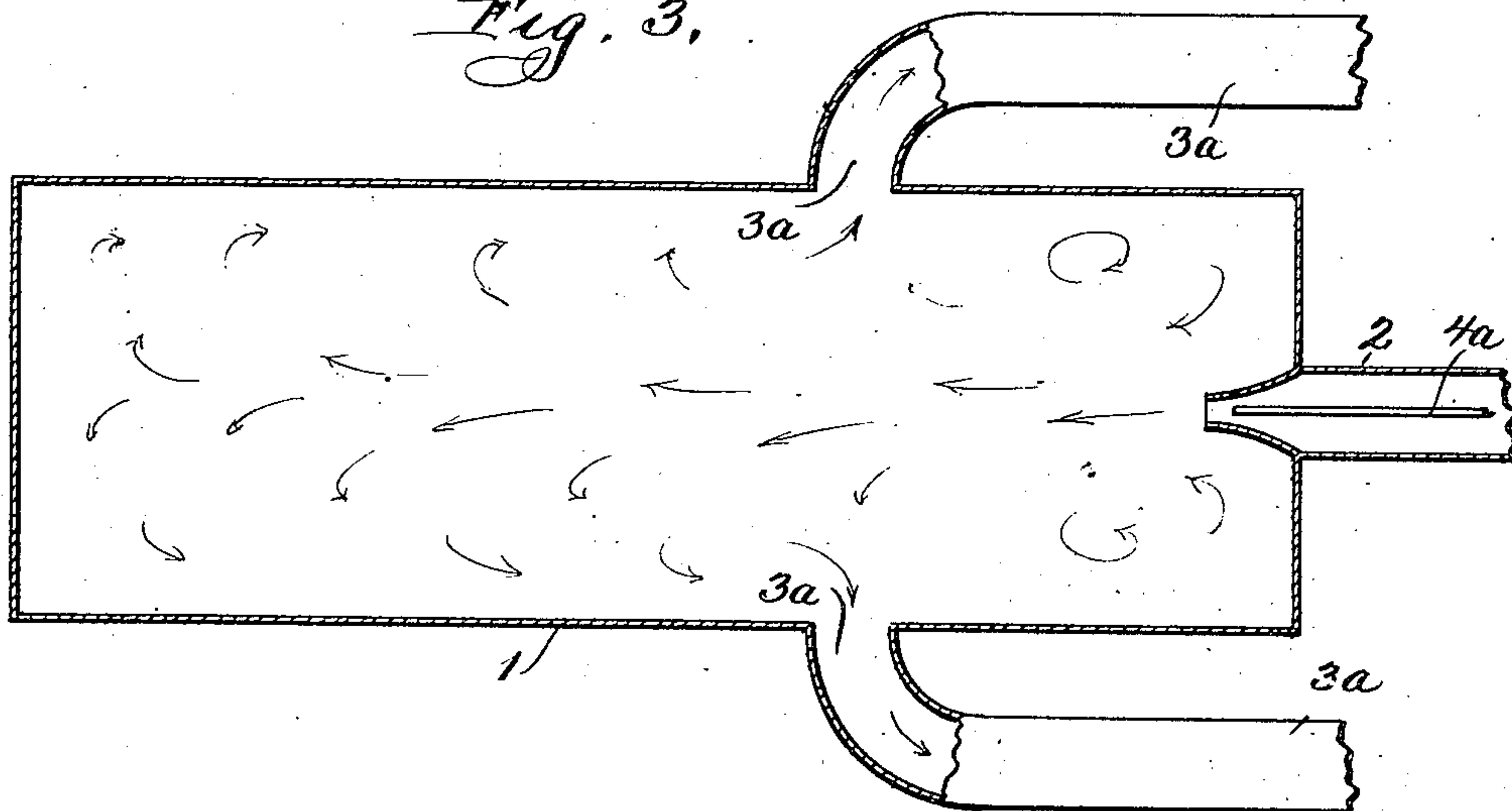
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2 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

OSCAR H. ELIEL, OF LA SALLE, ILLINOIS.

## SULFURIC-ACID CHAMBER.

No. 860,968.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed March 8, 1906. Serial No. 304,954.

To all whom it may concern:

Be it known that I, OSCAR H. ELIEL, of La Salle, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Sulfuric-Acid Chambers, of which the following is a specification.

The invention relates more particularly to the acid chambers and the flue and jet appliances in conjunction therewith; and the objects are, first, to provide a chamber, or a series of short connected chambers or compartments arranged side by side, so as to be operated from one end by introducing the sulfurous gases and vapors at one end or side, circulating them back and forth, and passing them out at the same end or side, instead of a single chamber into which the gases are introduced at one end or side and passed out at the opposite end or side, as is commonly done; second, to provide means for causing the fumes and gases to pass to and fro in the chamber, or series of chambers and successively through the several chambers or compartments of the series; and third, to arrange the flues and jet appliances so as to produce a better circulation of the gases in the chamber or series of chambers than heretofore.

I have attained these objects in the construction illustrated in the accompanying drawings, in which:

Figure 1 is a horizontal section of a series of chambers, arranged according to my plan, taken on the line 1—1 of Fig. 2; Fig. 2, a sectional elevation taken on the line 2—2 of Fig. 1; and Fig. 3, a horizontal section of one of the chambers, showing a modification in the arrangement of the eduction flues of the chambers.

In the drawings the numeral 1 designates short acid chambers of which there are three, as illustrated in the present case, but one of such chambers, or any desired number above three in series may be used. The chambers in series are preferably of uniform length and preferably placed side by side with their ends in a straight line. The length of the chamber is preferably about three times as great as its width but it is not intended to limit the invention to any specific dimensions of comparative width and length, any practically operative construction in this regard being within the contemplated plan.

The numeral 2 designates a fragment of the main induction flue leading from the Glover tower (not shown) and connecting with the chamber through the end wall centrally with relation to the side walls and at about one third of the chamber's height above the bottom.

The numeral 3 designates branched flues, the branches 3<sup>a</sup> connecting preferably through the end wall near the side walls and down pretty well toward the bottom commencing with the first chamber at the Glover-tower end of the series and leading to the main

part of said flue 3 which enters the next chamber 1 of the series from the end at the central point as above described relatively to the main induction flue 2. The flue connection 3 is repeated between each of the several chambers used in the series as illustrated. The branches 3<sup>a</sup> carry the fumes and gases from the first chamber to the flue 3 which enters the second chamber and so on throughout the series and all of the flues 3 may be regarded as auxiliary induction flues relatively to the several chambers except the last one which leads from the last chamber to the Gay Lussac tower (not shown), and may be regarded as the eduction flue relatively to all the chambers. The inner ends of the flues 2, 3, which enter the chambers, are preferably tapered so as to contract the opening at the extreme or discharge end.

The numeral 4 designates a steam pipe which is provided with branches 4<sup>a</sup> preferably corresponding with the flues 2, 3, in position and entering the same with open ends near the discharge ends of the said flues so as to deliver a jet of steam into the gases as they pass from said flues into the chambers.

An overflow pipe 5 is provided which has a trap to prevent the escape of gases. This is placed about six inches above the bottom of the chambers so there will be about that quantity of acid remaining constantly in the chambers. Passing out through the overflow to a tank 6, the acid is pumped off through a pipe or pipes 7 in the usual manner.

In the modification shown in Fig. 3 the branches 3<sup>a</sup> of the flues 3 enter at the sides of the acid chambers 1 instead of the front ends. The point of their entrance should be nearer the front end, where the gases enter the chamber, than the rear end or between the front end and a point toward said front end and somewhat past the mid length of the chamber.

The sulfurous gases from the Glover tower are delivered into the first chamber of the series through the flue 2 in the usual manner, being under pressure. The steam jet from the pipe 4<sup>a</sup> issues into said flue near the end where the gases are passing and just previous to their discharge into the chambers. This accelerates their movement along the central part of the chamber, causing the volume at or surrounding the axis or just below the axis of the chamber to move back in a current and strike the rear end of the chamber and be thrown thereby toward the front through the space below and surrounding the central rearwardly moving current and to pass out through the branches 3<sup>a</sup> near the bottom of the chamber. The forces thus brought to bear upon the gases and vapor in the chamber produce a turmoil of eddies or whirling volumes thereof and cause a more thorough mixture of the same. Greater friction is produced among the gases and between them and the interior of the chamber walls, thus producing



increased oxidation and improved results other things being equal. The general course of the gases in and through the chambers is indicated by the arrows, the like action being repeated successively in these several chambers of the series until the last, whence the passage is to the Gay Lussac tower as commonly known and used in sulfuric acid apparatus.

The principle of the invention is in the arrangement of a chamber, or chambers in series, and the flue connections whereby the gases and the fumes are introduced at or near one end or side of the chamber, or each chamber in the series and withdrawn at the same end or side in such manner as to produce reverse currents within the chamber or chambers and to pass the gases and fumes in this manner in and out at the same end or side and from chamber to chamber through a series, successively.

What I claim is:

1. In an apparatus of the class mentioned, an acid chamber having its greatest extension arranged horizontally in combination with an induction flue and an eduction flue communicating with the chamber near the same end of the chamber, the induction flue being located nearer the axial center of the chamber and in a higher plane than the eduction flue, as specified.

2. In an apparatus of the class mentioned an acid chamber having its greatest extension arranged horizontally in combination with an induction flue and eduction flues communicating with the chamber near the same end of the chamber, the induction flue being located in a higher plane than the eduction flues, as specified.

3. In an apparatus of the class mentioned, an acid chamber having its greatest extension arranged horizontally in combination with an induction flue and eduction flues communicating with the chamber near the same end, the induction flue being located nearer the axial center of the chamber and in a higher plane than the eduction flues, as specified.

4. In an apparatus of the class mentioned, an acid chamber in combination with an induction flue and an eduction flue communicating with the chamber near the

same end of the chamber and a steam jet pipe entering the chamber through the induction flue, as specified.

5. In an apparatus of the class mentioned, an acid chamber in combination with an induction flue and eduction flues communicating with the chamber near the same end of the chamber and a steam jet pipe entering the chamber through the induction flue, as specified.

6. In an apparatus of the class mentioned, a series of acid chambers in combination with induction flues and eduction flues communicating with the chambers, respectively near the same ends thereof and steam jet pipes entering the chambers through the induction flues, as specified.

7. In an apparatus of the class mentioned, a series of acid chambers having their greatest extension arranged horizontally and placed side by side, in combination with induction flues and eduction flues communicating with the several chambers near the same end, the induction flues being placed nearer the axial center of the chambers and in a higher plane than the eduction flues, as specified.

8. In an apparatus of the class mentioned, acid chambers connected in series, induction flues and eduction flues communicating with the several chambers near the front end, and jet pipes opening into the induction flues near their discharge ends, as specified.

9. In an apparatus of the class mentioned, acid chambers connected in series, in combination with induction flues communicating centrally with the respective chambers near the front end, jet pipes entering into the induction flues and terminating near their discharge ends and eduction flues communicating with the several chambers at the front end and near the bottom, as specified.

10. In an apparatus of the class mentioned, acid chambers connected in series provided with centrally located ports in the front end and peripherally located eduction ports near the front end, in combination with means for forcing the gases and fumes into the several chambers through such induction ports and out through such eduction ports producing reverse currents inwardly toward the rear and outwardly toward the front of the chambers, as specified.

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Witnesses:

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