

No. 652,689.

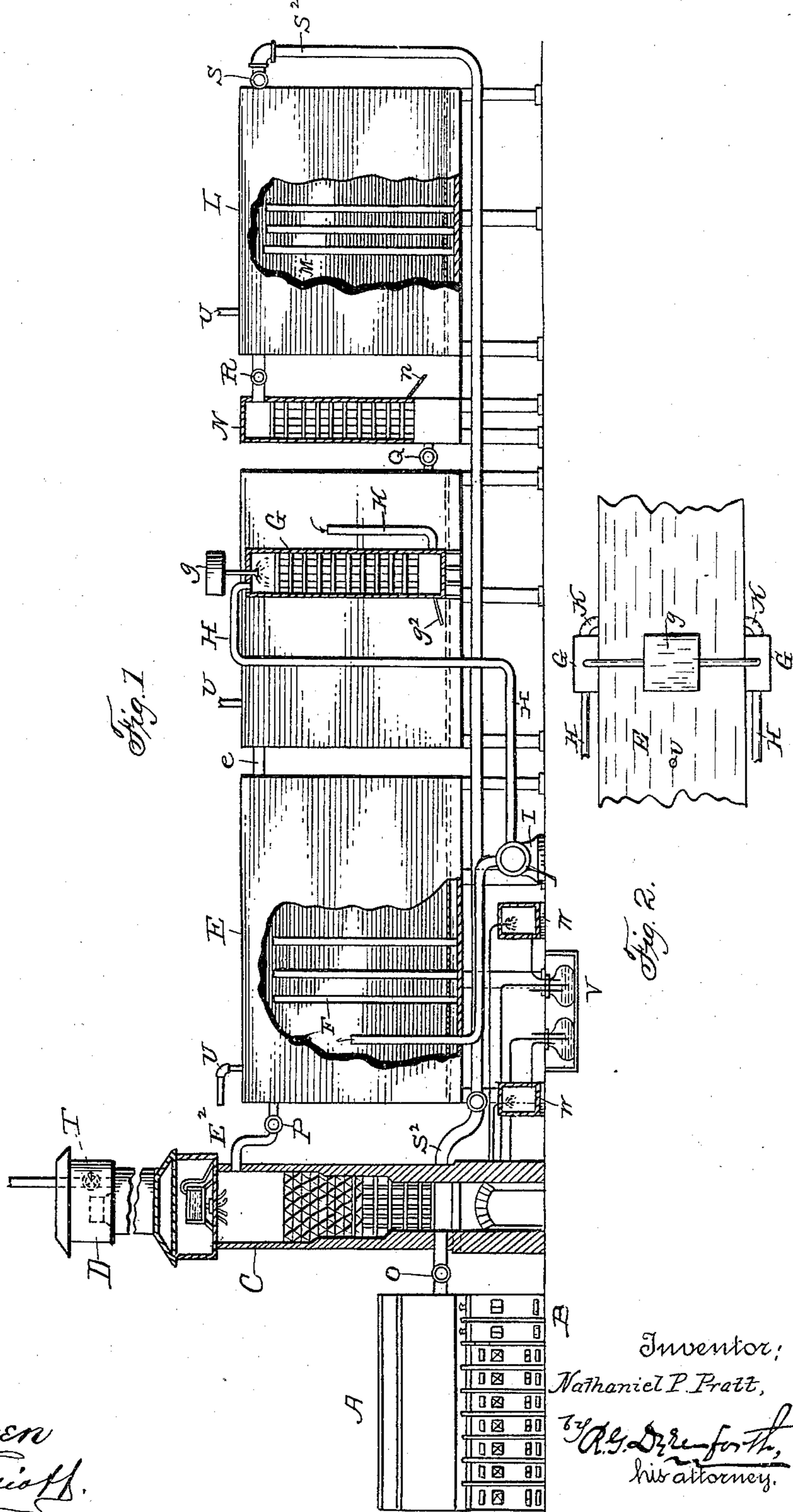
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N. P. PRATT.

APPARATUS FOR MAKING SULFURIC ACID.

(Application filed Apr. 27, 1897.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

NATHANIEL P. PRATT, OF ATLANTA, GEORGIA.

APPARATUS FOR MAKING SULFURIC ACID.

SPECIFICATION forming part of Letters Patent No. 652,689, dated June 26, 1900.

Application filed April 27, 1897. Serial No. 634,127. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL P. PRATT, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in the Manufacture of Sulfuric Acid; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the manufacture of sulfuric acid.

In a patent granted to me upon a process of and apparatus for making sulfuric acid, dated September 17, 1895, and numbered 546,596, I have illustrated an apparatus by which the gases from any part of the system toward the rear are withdrawn and reintroduced to another part of the system, toward the front thereof, in such manner as to be presented to the regular draft, but without interference therewith. I have found by experiments that I can withdraw a part of the gases from any portion of the system and reintroduce them at another portion in a direction directly opposite to and against the ordinary draft in connection with the gases from the furnace or Glover tower and produce highly-satisfactory and advantageous results.

The object of the invention is therefore, briefly stated, to effect rapid and continuous circulation of the chamber-gases of a sulfuric-acid system by withdrawing a portion thereof, as by a mechanical exhauster, and reintroducing the gases so withdrawn back into the system in a direction directly opposite to and against the ordinary draft, and, furthermore, to circulate the chamber-gases by withdrawing a portion of the same by a suitable exhauster and reintroducing them into the system in a direction directly opposite to and against the ordinary draft, in combination with the gases delivering from the furnace or Glover tower, by a fan or exhauster located in the Glover flue or a similar fan or exhauster located in the exit-flue or any other similar flue through which the gases travel on their ordinary way to the exit, which latter fan shall have sufficient power to over-

come the first fan's motion against the regular draft.

With these objects in view, generally stated, the invention consists in reversing the course of the circulation of a sulfuric-acid system and then, by way of overcoming the consequent interference with the ordinary draft, placing a fan capable of exerting greater pressure than that exerted by the draft in any flue through which the gases must travel on their way to the exit.

Specifically stated, the invention consists in withdrawing the gases from any part of the system (top, bottom, end, or sides) and reintroducing them to another part of the system, at the top, bottom, end, or sides; furthermore, in combining this manner of circulation with an artificial draft produced by a fan or exhauster located in the Glover flue or in the exit-flue above the Gay-Lussac tower or in any of the connecting-flues of the system through which the gases travel on their way out; furthermore, in circulating the gases from the back to the front of the system or from the front to the back in the same chamber or between two or more connected chambers; furthermore, in the employment of packed columns or towers located to the rear or outside of the line of the circulating arrangement and also the driving or drawing of the gases after being mixed by the exhauster and on their way out against the precipitating-surfaces of the packed columns by fans or exhausters located in the furnace-flue or Glover flue or in a flue above the Gay-Lussac tower or in any part of the connecting-flues through which the gases pass or are forced on their way out, and, finally, in employing comminuting-columns or converting-surfaces in the chambers and also the interposition of converters between the withdrawal and the discharge end of the circulating-flues.

In the accompanying drawings, forming a part of this specification, and in which like letters of reference indicate corresponding parts, I have illustrated the requisite elements of a sulfuric-acid plant pertaining to this invention, and in the said drawings, Figure 1 is a view in elevation, partly in section. Fig. 2 is a view in plan of a part of the plant.

Referring to the drawings, A designates the furnace; B, the niter-oven; C, the Glover tower; D, the Gay-Lussac tower, and E the acid-chamber. As these parts may be of the commonly-employed constructions, a detailed description of them is deemed unnecessary.

The acid-chamber E may be either a single chamber or two or more chambers connected by a flue or passage, as *e*, as preferred, and may have arranged therein a plurality of comminuting or converting surfaces F, against which the gases will contact on their entry and be precipitated. In any portion of the chamber there may be located a converter G, which may be packed with suitable precipitating surfaces, as usual, and is provided with an escape-pipe *g*², through which the sulfuric-acid as generated may flow to the chamber-pan; but it is to be understood that this converter may in some instances be dispensed with. Connecting with the chamber at a point near its rear and in this instance over the converter G' is a flue H, which leads downward and enters the acid-chamber, in this instance from beneath and near its front, and extends upward therein and terminates at or near the plane of the discharge-mouth of the flue E² from the Glover tower, and at a point intermediate of the ends of this flue and communicating therewith is a casing I, containing a fan or blower driven by any suitable power. At a point near the rear of the chamber and connecting in this instance with the lower portion of the converter G is a flue K, constituting in effect a continuation of the flue H, as it will be seen that there is a continuous passage for gases from the inlet-mouth of this flue K up through the converter G, flue H, and fan-casing I to the front of the acid-chamber; but, as before stated, the converter G may be omitted and the flues H and K be connected to constitute a continuous passage-way. Located adjacent to the chamber E is what may be termed a "cooling-chamber" L, which may be made in two or more sections and in any suitable manner, and in this chamber may be arranged precipitating-columns M, similar to those in the acid-chamber E. This cooling-chamber may be connected with the rear portion of the acid-chamber through a column or tower N, provided with an escape-pipe *n* and packed, like the converters, with suitable precipitating bodies or surfaces, against which the gases mixed by the exhaust-circulation are forced or drawn by the artificial draft created by either a fan O in a flue from the furnace, a fan P in the flue from the Glover tower, a fan Q in the flue entering the intermediate column N, a fan R in the flue leading from the intermediate column N and connecting with the chamber L, a fan S in the flue S², connecting the rear portion of the apparatus with the Gay-Lussac or to the exit, or a fan T in the exit-flue above the Gay-Lussac tower.

It is to be understood that the circulation through the exhaust-flue H may be in any

direction and that the connections of this flue with the chamber or chambers may be in either the top, bottom, side, or ends of the same.

The necessary water may be added to the system either by steam-jets U, entering the chambers or the flues or the converters, or by showering water or weak acid through the converters in the ordinary way, as from a tank *g*, supplied with water or acid in any convenient manner, or through the packed intermediate column N, or by all of these procedures.

It will be seen from the description that the gases entering through the flue E², connecting the Glover tower and the acid-chamber, are met by the gases drawn from the rear portion of the chamber and introduced to the front of the chamber through the flue H; but it is to be understood that interference with the ordinary or induced draft is overcome by having any one of the fans in the flues mentioned stronger than the fan which draws the gases from the furnace to the acid-chamber. Otherwise there would be no circulation, and the materials would simply remain inactive in the chambers. It is also to be understood that a steam-injector or gas-pump may be employed in lieu of the exhausters or fans in every position where the latter are used and produce the same result as the exhausters.

While I have shown but three columns F and M in the chambers E and L, it is to be understood that I do not limit myself to this precise number, as a greater or less number of them may be employed, if necessary.

Other parts of the apparatus—such as the acid-eggs V, acid-tanks W, and other elements of the plant here shown—are not specifically described, as it is deemed unnecessary that they should be.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A sulfuric-acid plant, comprising an acid-chamber, a flue leading therefrom and connecting with the generator of the acid-making materials, a fan in the flue, a second fan located to the rear of the first fan, and a flue connecting the rear portion of the chamber with the front portion thereof, and discharging against the freshly-entering materials, substantially as described.

2. A sulfuric-acid plant, comprising an acid-chamber, a flue leading therefrom, and connecting with the generator of the acid-making materials, a fan in the flue, a second fan located to the rear of the first fan, a flue connecting the rear portion of the chamber with the front portion thereof, and discharging against the freshly-entering materials, and comminuting-columns in the chamber, substantially as described.

3. A sulfuric-acid plant, comprising an acid-chamber, a flue leading therefrom, and connecting with the generator of the acid-making materials, a fan in the flue, a second

fan located to the rear of the first fan, a flue connecting the rear portion of the chamber with the front portion thereof, and discharging against the freshly-entering materials, 5 comminuting-columns in the chamber, an exit-flue at the rear portion of the chamber, and a fan in the flue, substantially as described.

4. A sulfuric-acid plant, comprising a suitable generator, an acid-chamber, a flue connecting the chamber and the generator, blast mechanism in the flue, a return-flue, including blast mechanism, connecting the rear portion of the chamber with the front portion 15 thereof, and discharging across the line of discharge of the flue connecting the generator and the chamber, and comminuting-columns in the acid-chamber in rear of the discharge end of the return-flue, substantially 20 as described.

5. A sulfuric-acid plant, comprising a suitable generator, and a plurality of connected chambers in communication therewith, comminuting-columns in the chambers, converters located toward the rear of the chambers 25 and in communication therewith, and return-flues including blast mechanism, connecting the converters and the front acid-chamber, substantially as described.

6. A sulfuric-acid plant, comprising a suitable generator and a plurality of acid-chambers, the whole being connected by flues, comminuting-columns in the chambers, converters located toward the rear of the chambers, 30 and in communication therewith, return-flues, including blast mechanism, connecting the converters and the first acid-chamber,

and blast mechanism in the connecting-flues between the respective chambers and the generator, substantially as described. 40

7. A sulfuric-acid plant, comprising a generator, a Glover tower, a Gay-Lussac tower, a plurality of acid-chambers, flues connecting these parts together, comminuting-columns 45 in the chambers, converters located toward the rear of the chambers and in communication therewith, return-flues, including blast mechanism, connecting the converters and the first acid-chamber, and blast mechanism 50 in the flues connecting the respective parts of the apparatus, substantially as described.

8. A sulfuric-acid plant, comprising a generator, a Glover tower, a Gay-Lussac tower, a plurality of acid-chambers, flues connecting these parts together, comminuting-columns 55 in the chambers, converters located toward the rear of the chambers, and in communication therewith, return-flues, including blast mechanism, connecting the converters and the first acid-chamber, a cooling-chamber located 60 in the rear of the last acid-chamber, comminuting-columns in the said latter chamber, a converter arranged between these two last-named chambers and connected by 65 flues therewith, and blast mechanism in the flues connecting the respective parts of the apparatus, and in the exit-flue above the Gay-Lussac tower, substantially as described.

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

NATHANIEL P. PRATT.

Witnesses:

W. P. HEATH,
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