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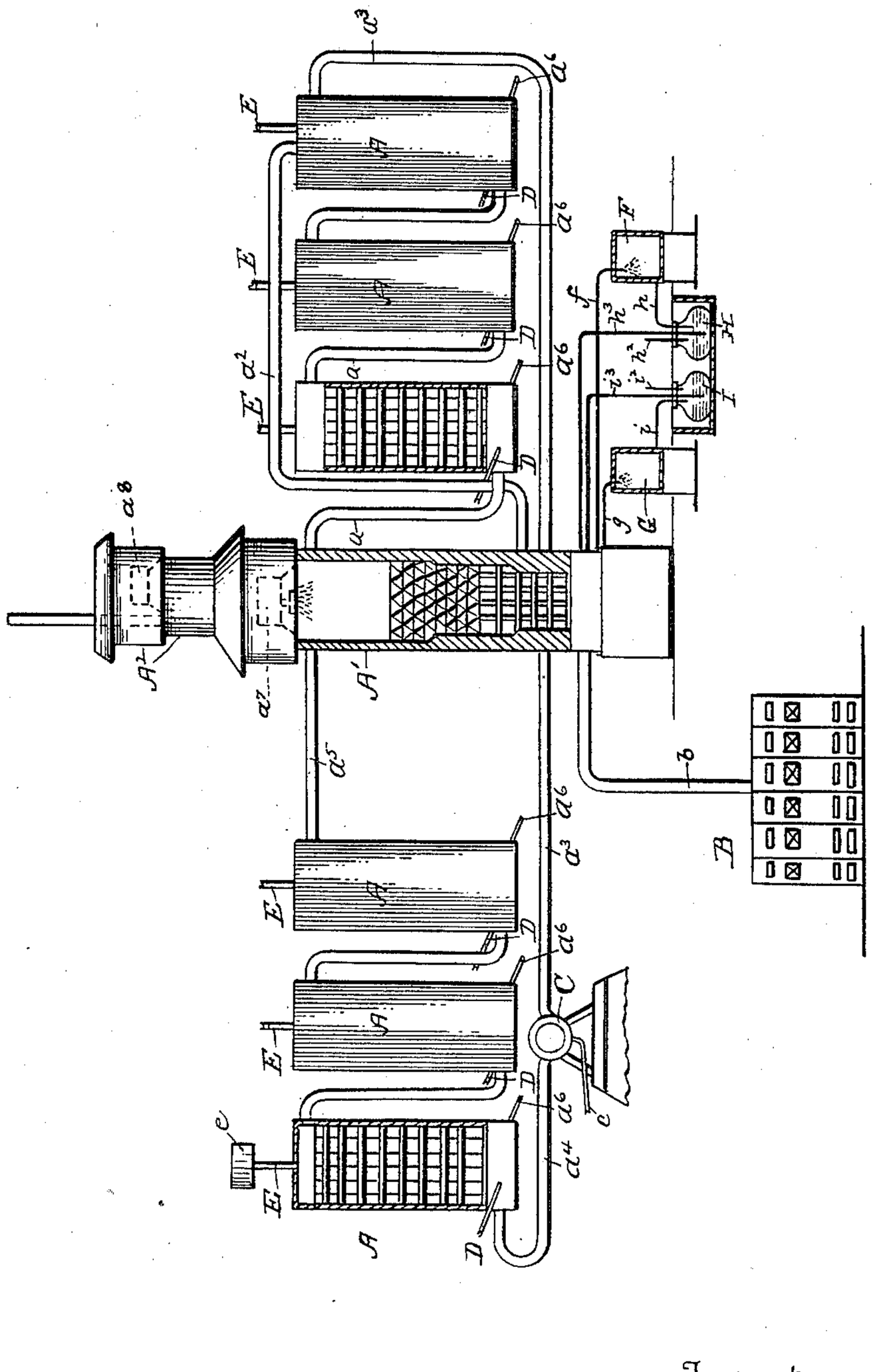
N. P. PRATT.

APPARATUS FOR MAKING SULFURIC ACID.

(Application filed Apr. 27, 1897.)

(No Model.)



Witnesses:
W. E. Bowen
R. H. Elliott.

Inventor:
Nathaniel P. Pratt,
by R. S. Ogleford,
his attorney.

UNITED STATES PATENT OFFICE.

NATHANIEL P. PRATT, OF ATLANTA, GEORGIA.

APPARATUS FOR MAKING SULFURIC ACID.

SPECIFICATION forming part of Letters Patent No. 652,688, dated June 26, 1900.

Application filed April 27, 1897. Serial No. 634,126. (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.

The object is to dispense with the employment of plain open acid-chambers and effect the production of the acid by the use of converters or packed columns or towers pure and simple, in connection with the usual furnace and niter-ovens and with or without the Glover or Gay-Lussac towers, or, in other words, to make the circulation and return through a series of converters alone.

With these objects in view the invention consists in the method of producing sulfuric acid and the apparatus therefor, as will be hereinafter fully described and claimed.

In the accompanying drawing, forming a part of this specification, and in which like letters of reference indicate corresponding parts, I have illustrated a form of apparatus capable of carrying my invention into effect, although it is to be understood that other forms of apparatus may be employed without departing from the spirit of the invention, and in this drawing, the figure is a view in vertical longitudinal section displaying a plurality of converters packed with suitable surfaces to effect precipitation.

Referring to the drawing, A designates a plurality of converters which are packed with bodies or surfaces to effect precipitation and to afford space for draft, and B the furnace employed in connection with the ordinary niter-oven. (Not shown.) The converters A are connected up in series in the following manner: The first converter, which connects by a flue *b* with the furnace, may be an ordinary converter or a Glover tower A′, and in case the latter is used there will be provision made for showering nitrous vitriol through it, as usual, and of the ordinary tanks, acid eggs, and compressor commonly used in connection with it and the Gay-Lussac tower A^2, as will be hereinafter described. At the upper portion of this converter is connected a flue *a*, which extends down and into the lower portion of the next converter, and from the upper portion of this latter converter extends a similar flue to the lower portion of the next converter, and so on throughout the series, the last converter having connected with it a flue a^2, which may discharge into the open air or may lead to a Gay-Lussac tower, where one is employed, for the usual purpose. Connecting with the upper portion of the last converter just described is a flue a^3, which extends to a fan or blower C, which may be constructed of any suitable acid-resisting material and provided with a drip-pipe *c* for carrying off any acid condensed in the fan-casing, and connecting with the casing of this fan is a flue a^4, leading to the first of another series of converters, which are connected in like manner as the series already described and with the first series by a flue a^5, as shown. It is to be understood that suitable drip or escape pipes a^6, discharging into storage-tanks, may be employed, or, if preferred, the discharge may take place directly into carboys or other suitable receptacles, and as this arrangement is obvious a description or illustration thereof is deemed unnecessary. The object in thus providing each converter with a drip-pipe is to obviate the necessity of employing a separate cooling or precipitating chamber for collecting the acid in bulk, as by the arrangement exhibited the acid is collected as fast as produced, and as the operation is continuous and very rapid, owing to the forced draft to which the gases are subjected and the violence with which they are projected against the precipitating-surfaces, there will be a steady discharge or escape of sulfuric acid from each of the series of converters, and the aggregate production or output per diem of the series will be in excess (the acid-producing space being the same) of a plant having the ordinary lead chamber, cooling-chamber, and packed columns and that depends solely on the natural draft of the apparatus to bring about the chemical reactions.

It will be noted by reference to the figure that the converters are divided into two se-

ries, into the first of which the sulfurous acid generated in the furnace and the nitrogen acids generated as in niter-ovens are discharged, thence circulate through each succeeding converter, and from the last of the series are drawn by the fan or blower back to the first of another series, thence through this series, and on again back to the first series, thereby keeping up a continuous and uninterrupted circulation or flow of gases through the series of converters. In their passage through these converters the gases are caused to contact with the precipitating-surfaces and are retarded and condensed and caught in the manner described. By the arrangement described a very rapid production of sulfuric acid can be effected by the employment of a comparatively-small plant, as by the arrangement described large acid-chambers may be entirely dispensed with. The necessary water is added to the system either by steam-jets D entering the flues or the converters at or near their bottoms or by showering water or weak acid down through the converter tops in the ordinary manner through pipes E, supplied from conveniently-located tanks *e*, (only one being shown in this instance,) the acid to these tanks being furnished from any suitable source, or by both methods.

Located adjacent to the system are two tanks F and G, the former of which catches the acid conveyed from the foot or pan of the Glover tower through a pipe *f* and the latter the acid from the foot or pan of the Gay-Lussac tower through a pipe *g*. From these tanks F and G the acid passes through pipes *h* and *i*, respectively, to two acid-eggs H and I, pressure being maintained in these eggs by means of air supplied through pipes h^2 and i^2, connecting with an air-pump (not shown) or other air-pressure-generating device. From the acid-egg H the acid is forced by the air-pressure through a pipe h^3 to a tank a^7 over the top of the Glover tower, whence it is showered down through the packing contained therein, and from the acid-egg I the acid is also forced by the air-pressure through a pipe i^3 to a tank a^8 over the top of the Gay-Lussac tower, whence it is also showered down through the packing contained therein. The acid that runs out of the bottom of the Glover tower is pumped up to be showered down to the Gay-Lussac tower, and vice versa.

It is to be understood that I do not limit myself to the exact arrangement of the converters nor to the precise manner in which they are connected up, the point of the invention being that the rapid and uninterrupted circulation of gases may be effected through any number of converters without employment of open chambers.

While I have shown but two of the converters and the Glover tower as provided with packed or precipitating surfaces, it is to be understood that all of the converters are to be similarly packed and also the Gay-Lussac tower.

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

1. The herein-described apparatus for making sulfuric acid, comprising a suitable generator, two series of connected converters packed with suitable precipitating bodies or surfaces, a flue connecting the last of the first series of converters with the first of the second series of converters, and blast mechanism included in this flue, substantially as described.

2. The herein-described apparatus for making sulfuric acid, consisting of a generator, a Glover tower, two series of connected converters in communication with the Glover tower, on one side thereof, a series of connected converters on the other side of the Glover tower, and also in communication with the Glover tower, a flue, including blast mechanism, connecting the last of the first series of converters with the first of the second series of converters, a Gay-Lussac tower, and a connection between one of the first series of converters and 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,

J. E. PRATT.