

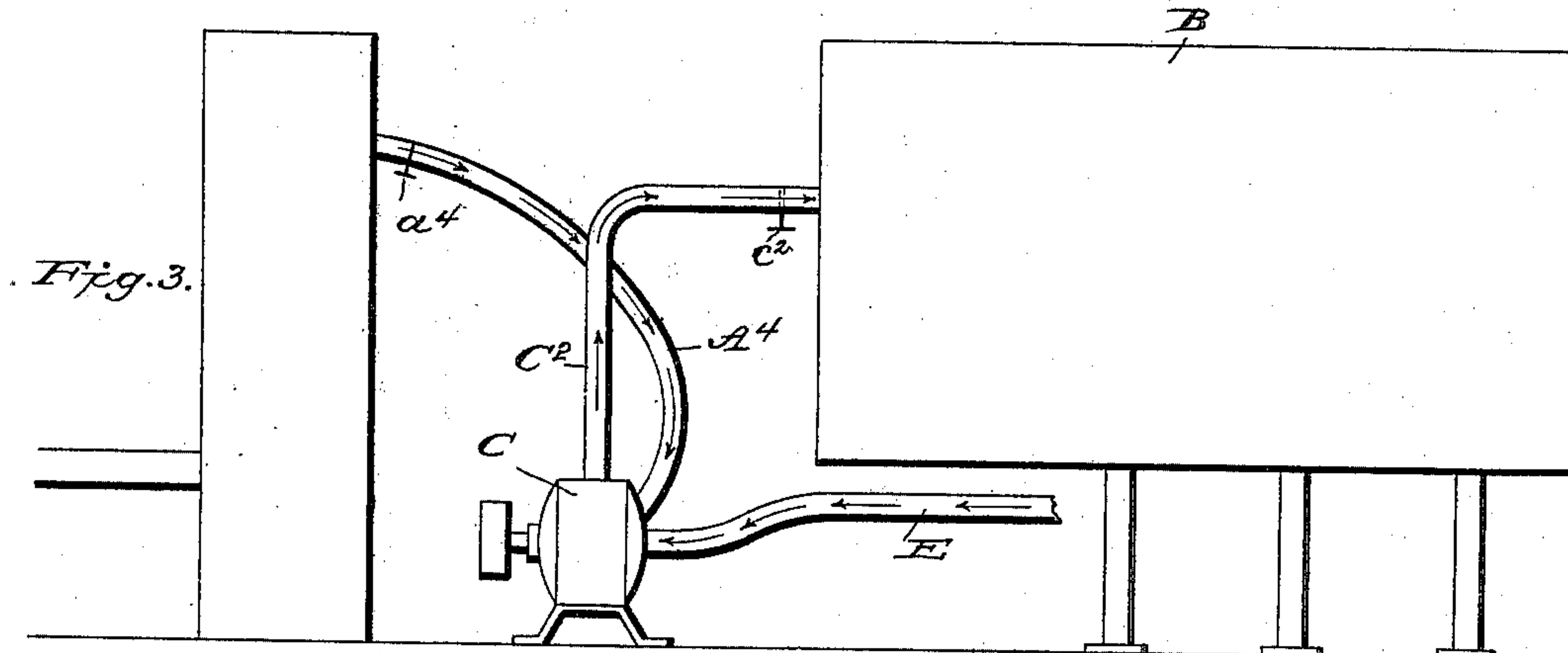
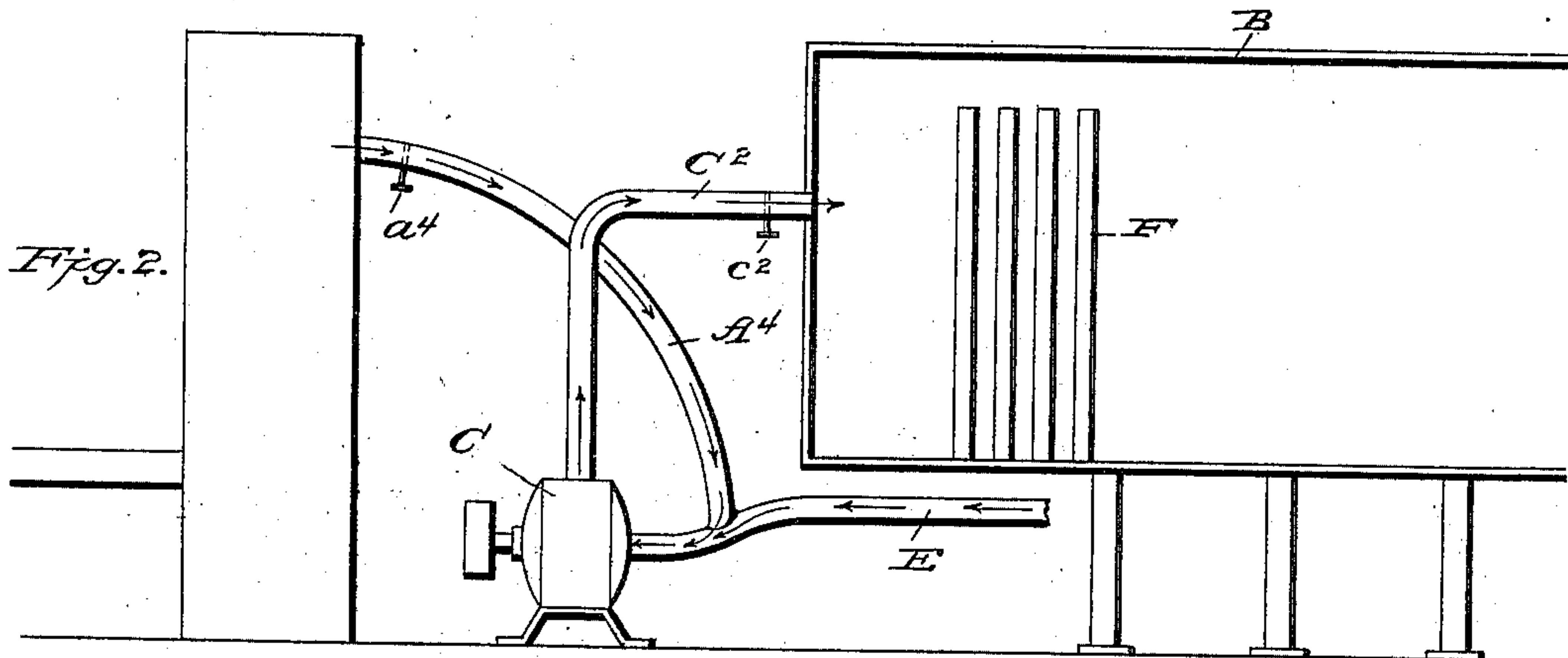
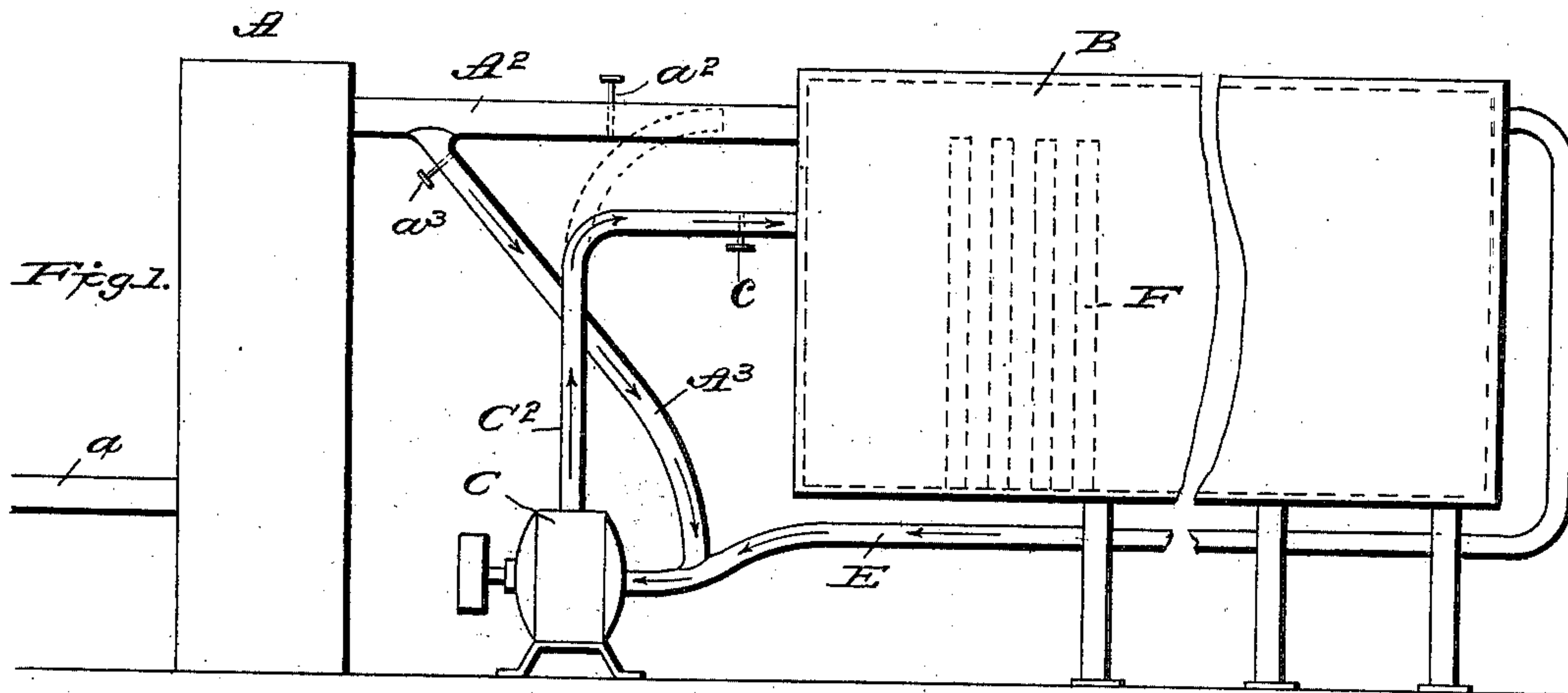
No. 652,690.

Patented June 26, 1900.

N. P. PRATT.
APPARATUS FOR MAKING SULFURIC ACID.

(Application filed Dec. 9, 1898.)

(No Model.)



WITNESSES:

G. S. Elliott.
R. M. Elliott.

INVENTOR:

Nathaniel P. Pratt,

by *R. S. Dymally*
his attorney.

UNITED STATES PATENT OFFICE.

NATHANIEL P. PRATT, OF ATLANTA, GEORGIA.

APPARATUS FOR MAKING SULFURIC ACID.

SPECIFICATION forming part of Letters Patent No. 652,690, dated June 26, 1900.

Application filed December 9, 1898. Serial No. 698,778. (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.

In an application for patent on an improvement in the manufacture of sulfuric acid, filed by me in the United States Patent Office on or about October 30, 1896, and serially numbered 610,619, I show, among other details of construction, a novel means by which at one and the same time I can obtain a direct pull or suction on the furnace and Glover tower, or on either, and effect a positive and advantageous pressure on the remainder of the system. This result is accomplished by employing a mechanical fan or blower into the casing of which opens one end of a flue, the other end to connect with any part of the system at the top, sides, bottom, or ends of either of the chambers, flues, &c., and in connecting the blower with the Glover flue by a pipe the discharge end of which pierces the Glover flue and mouths toward the rear end of the system, so that when the blower is in operation the gases from the rear portion of the system will be returned to the front portion thereof and be reintroduced into the lead chamber along with the freshly-entering gases from the generators. By this procedure the furnace, generators, and gases will be subjected to the action of a strong, direct, and positive pull or suction as opposed to the ordinary weak, indirect, non-positive, and natural draft resulting from the usual chamber operations, so that a rapid and constant mixing and projection of the acid-making materials is effected, resulting in a largely-increased output of acid in a given time and a highly-augmented draft on the furnace, generators, and the other parts of the system. The construction described in operation is productive of the highest and most satisfactory results when the Glover flue is of such length as to permit the returned gases projected therein by the blower and the freshly-

entering gases from the generators to spread to all sides of the said flue, and thus be thoroughly intermixed before entering into the chamber; but where the Glover flue is of short length, which is frequently the case, I find that the gases from the blast-nozzle in the Glover flue do not have sufficient room to spread out to all sides of the flue, and thus produce the proper induced draft on the furnace through the Glover tower before the gases reach the chamber.

It is the object of this invention in a simple, effective, and thoroughly-practical manner and without necessitating any change in the structural arrangement of an existing plant to effect the proper draft through the system irrespective of the length of the Glover flue.

The invention is characterized by shunting the current of fresh gases from the generators before entry into the chamber, directing these into the current of partially-spent gases that are being returned for further chamber action, and then projecting these mixed gases into the chamber.

The invention is further characterized by shunting or directing the current of fresh gases from the Glover flue and mixing these with the partially-spent gases that are being returned for further chamber action, either before or after entry into the blower, and then in projecting the gases thus combined into the chamber through the Glover flue or below or to one side of the same.

The invention is characterized still further by placing a damper in the Glover flue, then tapping a pipe into the flue on the Glover side of the damper and tapping this pipe either into the flue for returned gases from the rear of the system or directly into the blower-casing, and then connecting the blower with the chamber by a pipe either entering the chamber below the Glover flue or tapped into the Glover flue on the chamber side of the damper.

The invention consists in the novel details of construction, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like letters of reference indicate corresponding parts, I have illustrated in a diagrammatic

manner so much of a sulfuric-acid plant as is necessary to an understanding of this invention; and in the drawings.

Figure 1 is a view in side elevation displaying the draft-inducing mechanism constituting one embodiment of my invention. Fig. 2 is a similar view displaying another embodiment thereof, and Fig. 3 is a similar view showing still another embodiment of the invention.

Referring to the drawings and to Fig. 1 thereof, A designates the Glover tower, communicating, as usual, with the generators (not shown) by a flue a ; B, a portion of a lead chamber or a plurality of lead chambers; A^2 , the Glover flue, connecting the Glover tower and the lead chamber or chambers; C, a fan or blower; E, a flue connecting the blower and the chamber with the converters or with any other desired part of the system, and C^2 a flue connecting the blower with the front chamber below the flue A^2 , as shown in full lines, or directly with the flue A^2 , as indicated by dotted lines. So far the structure described, with the exception of the alternate manner of establishing communication between the flue A^2 and the front chamber, is the same as that shown in my application referred to, and as the parts may be of any well-known or preferred construction further description thereof is deemed unnecessary.

In the embodiment of my invention shown in Fig. 1 I cut off through and direct communication between the Glover tower and the chamber by a damper a^2 in the Glover flue A^2 , and at any point in this flue between the damper and the Glover tower I tap one end of the pipe A^3 , the other end of which is tapped into the flue E, leading from any part of the rear of the system, or it may enter the exhaustor-casing independently of flue E. The rear end of the flue E may connect with the rear portion of the acid-chamber, as shown in Fig. 1, only it being understood that the same or a similar arrangement is to be employed in connection with the other forms of embodiment of my invention, or where converters are employed with these, or with a series of packed chambers alone in place of the ordinary chambers, or with an open chamber only, or with a combination of both open chambers and packed towers, and for this reason it is distinctly to be understood that I do not limit the application of my invention to a plant employing converters. The front end of the flue E connects with the casing of the blower C in this instance at one side, and the blower is connected to and placed in communication with the front lead chamber by the flue C^2 . The suction on the furnace may be controlled at will by the damper a^2 , and it will not in any manner interfere with the efficient working of the blower in drawing the gas-making materials through the chamber or chambers or through the converters where these latter are employed. By the arrangement shown all the gas from the furnace and

the Glover tower will be delivered into the chamber or chambers through the blower along and in direct contact with the gases drawn from the rear of the plant, and I thus get a direct and powerful suction on the furnace. The latter result is perfectly practicable of obtainment and is highly advantageous in the procedure, because it will only take a small part of the blower capacity to draw all that is necessary from the furnace, and the circulation through the chambers or the converters will not materially be interfered with, for the reason that I can maintain all speed on the blower and check any undue draft on the furnace by placing and regulating a damper a^3 in the flue A. I may also place a damper c in the flue C^2 , so that in case it should be necessary to shut down the blower for any length of time the dampers a^3 and c can be closed and the damper a^2 in the Glover flue be opened, and the process can then be continued in the usual way by employing a natural draft. It is to be understood that I do not limit myself to the precise location of the dampers shown or to any precise form of damper, as their positions and forms may be changed, if necessary, without departing from the spirit of my invention.

In the embodiment of my invention shown in Fig. 2 I display an arrangement by which I dispense with the Glover flue for connecting the Glover tower and the front of the chamber, as in practical operation according to the present invention a continuous flue is not essential, being more in the nature of an adjunctive means affording convenience in case I desire to maintain an alternate flue-way between the generators or Glover tower and the chamber. In this latter embodiment of my invention the Glover flue constitutes, substantially, an equivalent of the pipe A^3 in Fig. 1, this flue (designated by A^4) being tapped into the flue E, leading from the rear of the system, or run into the blower-casing independently of the flue E. Thus the freshly-entering gases from the Glover tower pass through the flue A^4 and are mixed with the partially-spent gases returning from the rear of the system through the pipe E and are discharged from the blower through the pipe C^2 into the chamber. Draft through the flues A^4 and C^2 may be regulated at will by dampers a^4 and c^2 . In carrying my invention into effect in connection with the last-described embodiment thereof it is to be understood that the flue E may connect with the last of a series of chambers, with the ordinary converters, with a series of packed towers alone in lieu of the ordinary chambers, or with a combination of both open chambers and packed towers, and as this arrangement will be perfectly obvious a detailed description and illustration is deemed unnecessary.

In some works it is customary to omit the Glover and Gay-Lussac towers, or either of them, and of course if I desire to do this it is to be understood that I consider my in-

vention of sufficient scope to accord me this privilege.

As shown in dotted lines in Fig. 1 and in full lines in Fig. 2, I may employ in connection with the lead chamber columns F or other forms of filling or packing constituting precipitating-surfaces.

In the embodiment of my invention shown in Fig. 3 practically the same arrangement of mechanism as that shown in Fig. 2 is employed, with the exception that instead of tapping the pipe in the Glover flue into the flue E in the rear of the apparatus I enter the said pipe into the blower-casing, so that the fresh materials from the generators are mixed within the blower-casing and not within the flue E, as shown in Figs. 1 and 2. The operation of this embodiment of my invention is the same as that in the other two figures described. It is to be understood that in this third embodiment of my invention I may employ the precipitating-columns, as shown in Figs. 1 and 2, or may omit them.

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

1. In a sulfuric-acid plant, the combination with a flue for supplying sulfurous acid and a sulfuric-acid-producing system, of a mechanical blower, a flue connecting the system, toward its rear, with the blower, whereby partially-spent gases may be withdrawn and returned toward the front portion of the system, and a flue for conveying fresh gases from the said generator to the blower, whereby mixture of the fresh and of the partially-spent gases is effected, and a flue for conveying the mixed gases, under pressure, from the blower into the system, substantially as described.

2. In a sulfuric-acid plant, the combination with a Glover tower and a sulfuric-acid-producing system, of a mechanical blower, a flue connecting the system, toward its rear, with the blower, whereby partially-spent gases may be withdrawn and returned toward the front portion of the system, and a flue for conveying fresh gases from the Glover tower to the blower, whereby a mixture of the fresh and of the partially-spent gases is effected,

and a flue for conveying the mixed gases, under pressure, from the blower into the system, substantially as described.

3. In a sulfuric-acid plant, the combination with the Glover tower, chamber, and flue connecting the Glover tower and the chamber, of a blower, a flue in communication with the rear portion of the plant, and opening into the blower-casing, a damper in the Glover flue, a pipe tapped into the Glover flue on the Glover side of the damper and discharging into the blower, and a pipe connecting with the blower-casing and discharging into the chamber on the chamber side of the damper, substantially as described.

4. In a sulfuric-acid plant, the combination with the Glover tower, chamber, and flue connecting the Glover tower and the chamber, of a blower, a flue in communication with the rear portion of the plant, and opening into the blower-casing, a damper in the Glover flue, a pipe tapped into the Glover flue on the Glover side of the damper and opening into the flue from the rear portion of the plant, and a pipe connecting with the blower-casing and discharging into the chamber on the chamber side of the damper, substantially as described.

5. In a sulfuric-acid plant, the combination with a Glover tower and a sulfuric-acid-producing system, of a mechanical blower, a flue connecting the system, toward its rear, with the blower, whereby partially-spent gases may be withdrawn and returned toward the front portion of the system, a flue for conveying fresh gases from the Glover tower to the blower, whereby a mixture of the fresh and of the partially-spent gases is effected, a flue for conveying the mixed gases, under pressure, from the blower into the system, and dampers for regulating the operation of the flues, substantially as described.

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

NATHANIEL P. PRATT.

Witnesses:

R. S. McDONALD,
W. P. HEATH.