

No. 743,922.

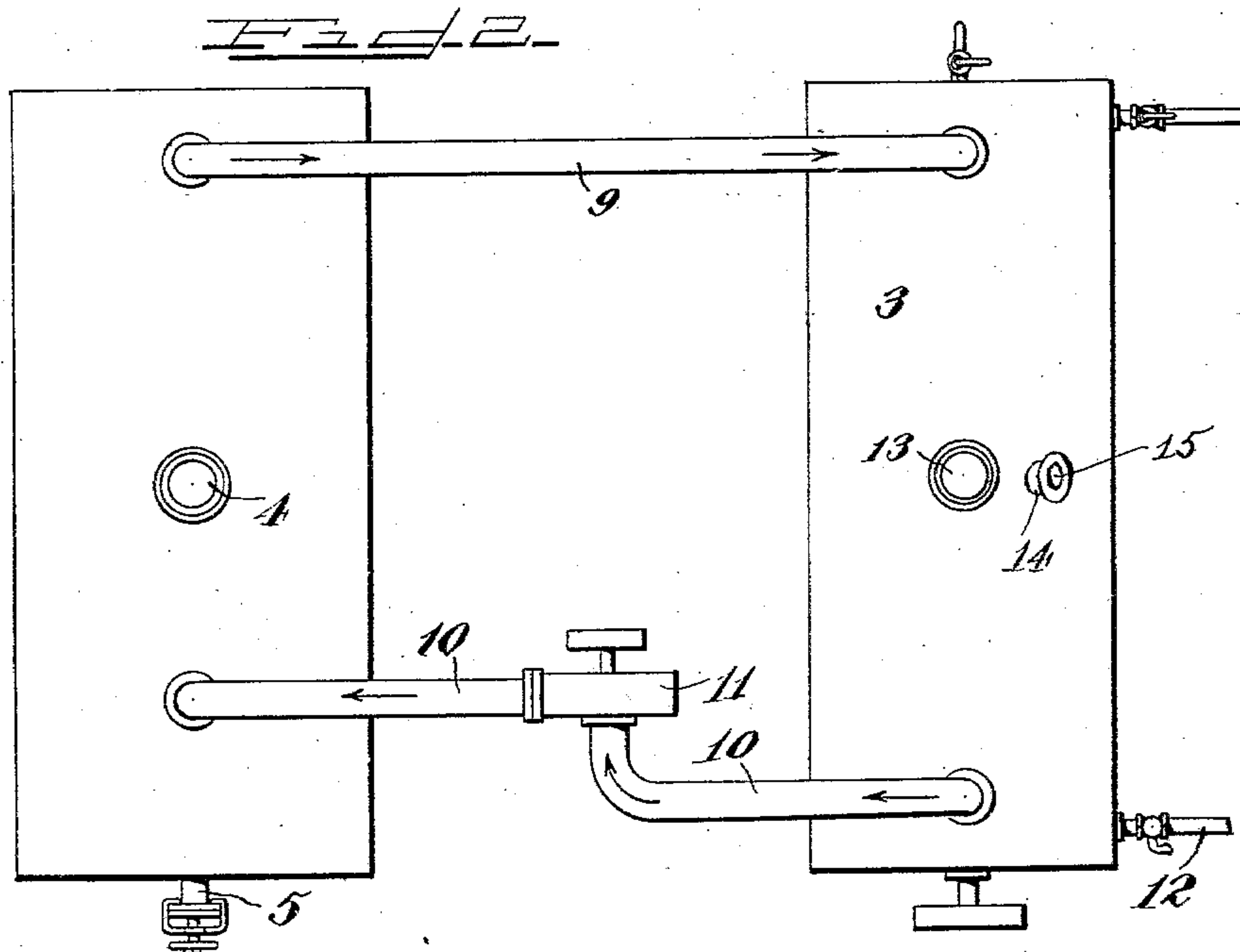
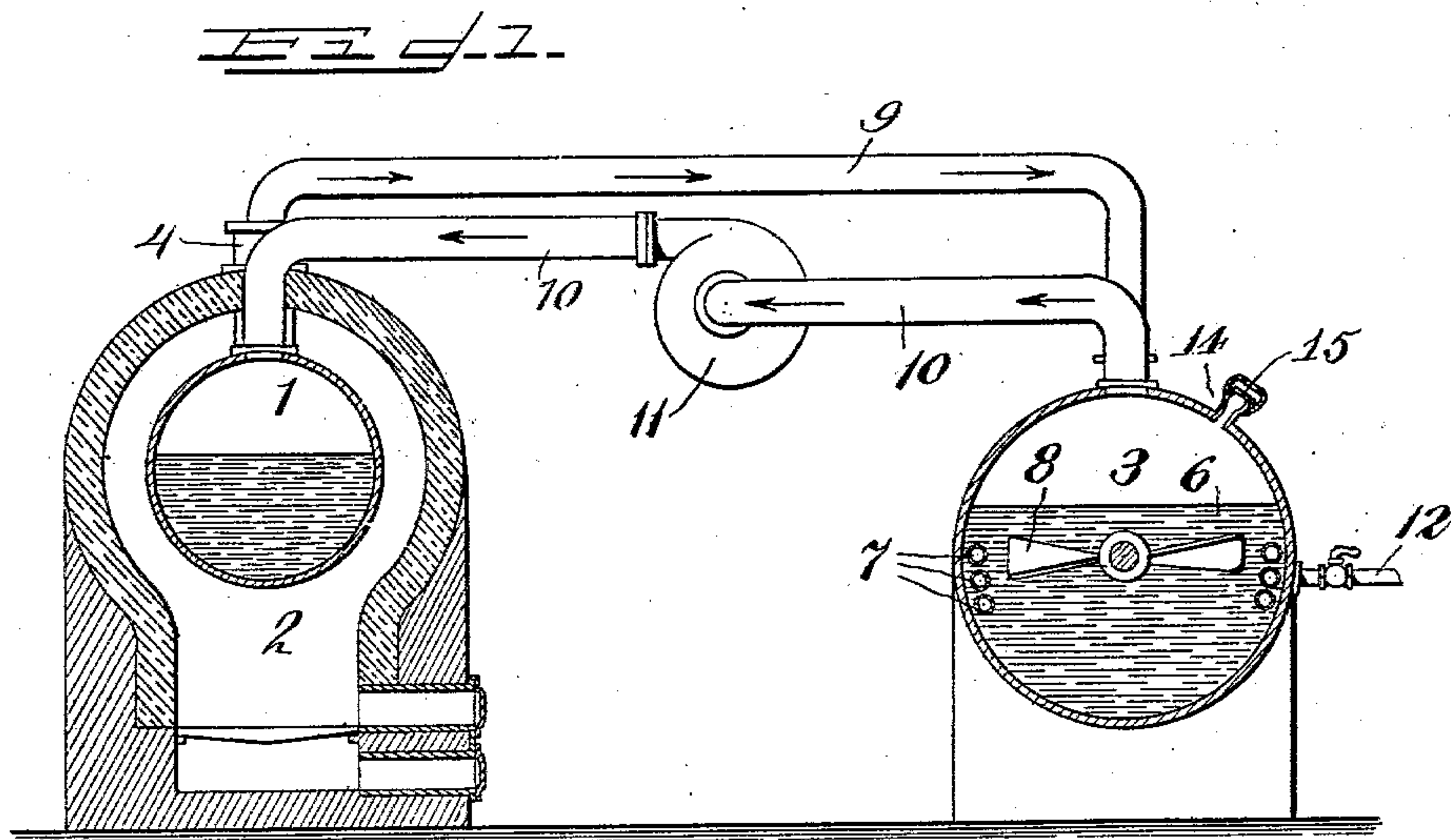
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APPARATUS FOR MAKING MIXTURES OF NITRIC AND SULFURIC ACIDS.

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NO MODEL.



WITNESSES:

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FRANCIS I. DU PONT, OF WILMINGTON, DELAWARE.

APPARATUS FOR MAKING MIXTURES OF NITRIC AND SULFURIC ACIDS.

SPECIFICATION forming part of Letters Patent No. 743,922, dated November 10, 1903.

Application filed December 26, 1902. Serial No. 136,523. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS I. DU PONT, a citizen of the United States, residing in the city of Wilmington, county of Newcastle, and State of Delaware, have invented certain new and useful Apparatus for Generating and Condensing Acids and other Substances; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to apparatus for generating and condensing acids and other substances, but particularly to apparatus for generating nitric-acid fumes and for producing mixtures of nitric and sulfuric acids.

My invention consists in the introduction of circulating-conduits connecting an acid-generator with a condensing-chamber and arranged to convey fumes from the generator to the condensing-chamber and to return unabsorbed gases from the condensing-chamber to the generator and generally in the features hereinafter set forth in the claims.

The objects of my invention are to improve acid generating and condensing apparatus, and particularly apparatus for producing mixtures of nitric and sulfuric acids, such as are used in making nitrocellulose, to render the apparatus efficient, to avoid the escape of uncondensed acid fumes, and to prevent corrosion of the apparatus by the fumes evolved.

I will now proceed to describe my invention with reference to the accompanying drawings, in which one form of apparatus embodying my invention is illustrated, and will then point out the novel features in claims.

In the said drawings, Figure 1 shows a vertical section of the apparatus. Fig. 2 shows a top view thereof.

The apparatus illustrated in the drawings comprises a retort or generator 1, located within a furnace 2, a condensing-chamber 3, and conduits connecting the retort and condensing-chamber, as hereinafter described. The retort is provided with a charging-opening 4 and with a discharging-opening 5, through which residue remaining in the retort upon the conclusion of the operation may be removed. Both of these openings may be closed in any suitable or ordinary manner

during the operation of the apparatus. The furnace by which the retort may be heated may be of any customary or ordinary construction and requires no detailed description.

The condensing-chamber 3 or "absorber," as it may also be called, contains during the operation of the apparatus a body of liquid 6, which will condense and absorb the fumes generated in the retort 1. Said condenser is provided with cooling-coils 7, through which a cooling medium may be circulated to keep this liquid 6 cool, and a stirrer 8, arranged to be driven in any suitable or well-known way, may also be provided to keep the liquid thoroughly mixed. The retort 1 is connected with the condensing-chamber 3 by means of a discharge-pipe 9 and a return-pipe 10, which together constitute a circulating-conduit. In one of these pipes, preferably in the return-pipe, is a blower 11 or other suitable device for maintaining circulation of the gases.

The condensing-chamber 3 is provided with a cock 12, through which the mixed acids may be drawn off, and with an opening 13, through which charges of absorbing acid may be introduced. It is also provided with a safety-vent 14, provided with a check-valve 15, which prevents entrance of air into the condensing-chamber through said opening, but permits the escape of gas from the condensing-chamber when pressure exists therein. Such opening serves to permit escape of gas when the air and gas within the chamber expands as a result of increase in temperature in the chamber and as a result of partial displacement of the air by vapors from the retort.

I will describe the operation of my apparatus as the same is used in producing mixtures of nitric and sulfuric acids. In this process a mixture of nitrate of soda and sulfuric acid is placed within the retort 1 and sulfuric acid is introduced into condensing-chamber 3 until the latter is about half filled, the blower 11 is operated to cause a current of air to circulate back and forth between the two tanks, and heat is applied to the retort, while a cooling medium is circulated through the coils 7. The nitric-acid fumes as they are generated are carried away rapidly by the currents of air produced by the blower 11 and are pro-

jected against the surface of the sulfuric acid in chamber 3 and are to a great extent condensed thereby. Such gases as are not condensed and absorbed are drawn back through
 5 pipe 10 by the blower 11, are passed through the retort 1, are there mixed with a further quantity of nitric-acid fumes, and are forced through the pipe 9 back into the condensing-chamber.

10 It will be seen that with this apparatus the escape of acid fumes is to a great extent prevented, because only those fumes escape which remain in the apparatus at the conclusion of the operation and are practically
 15 non-condensable in the liquid within vessel 3. The use of the blower 11 greatly facilitates the evolution of nitric-acid fumes in the retort, rendering the operation of the apparatus very rapid.

20 It is obvious that the apparatus herein described is susceptible of various variations and modifications without departing from the spirit and scope of my invention, and I do not limit myself to the particular construction herein illustrated and described.
 25

In another application for Letters Patent, executed concurrently herewith, I have claimed the process of generating and condensing acid fumes above described.

30 An important advantage of this process and of the apparatus above described is that since the sulfuric acid keeps the air and gases in the apparatus perfectly dry the nitric-acid

fumes will not attack the pipes 9 and 10 and other parts of the apparatus with which said
 35 fumes come in contact if these parts be of iron. This greatly increases the strength, simplicity, and durability of the apparatus and makes it relatively inexpensive.

What I claim is—

40 1. In an apparatus for obtaining mixtures of nitric and sulfuric acids, the combination with a retort, of an absorber, a conduit connecting the same for conveying fumes from the retort to the absorber, a return-conduit
 45 connecting said absorber and retort, arranged to discharge the returned unabsorbed gases into said retort, and means for maintaining circulation of gases from said retort through
 50 said outgoing-conduit absorber, and return-conduit, into and through the retort.

2. In an apparatus for obtaining mixtures of nitric and sulfuric acids, the combination with a retort for generating nitric acid, and an absorber for containing sulfuric acid, of
 55 circulating-conduits connecting said retort and absorber, and arranged to return the unabsorbed gases, and a blower in said circulating-conduit.

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

FRANCIS I. DU PONT.

Witnesses:

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 CLIFFORD V. MANNERING.