

No. 711,187.

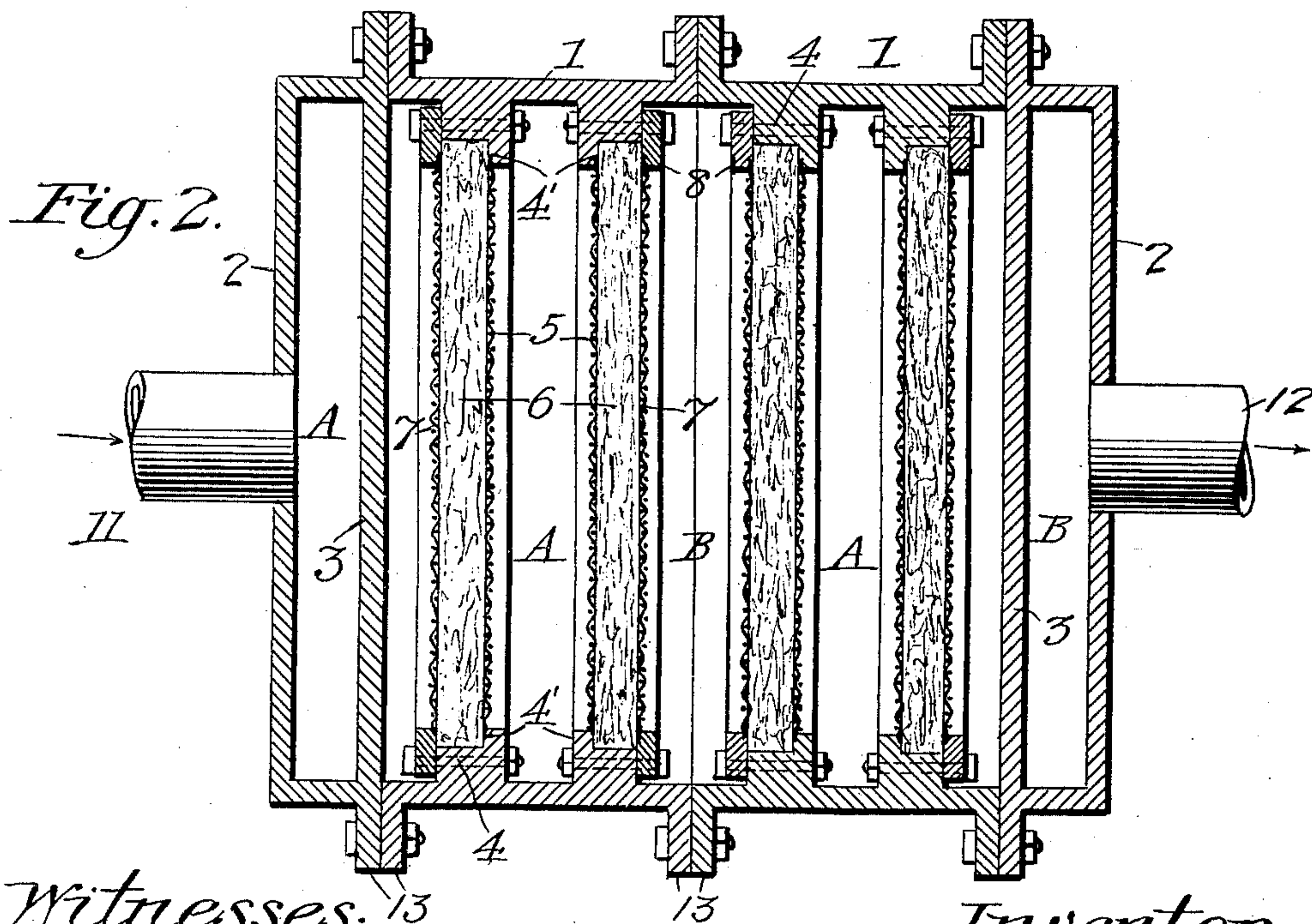
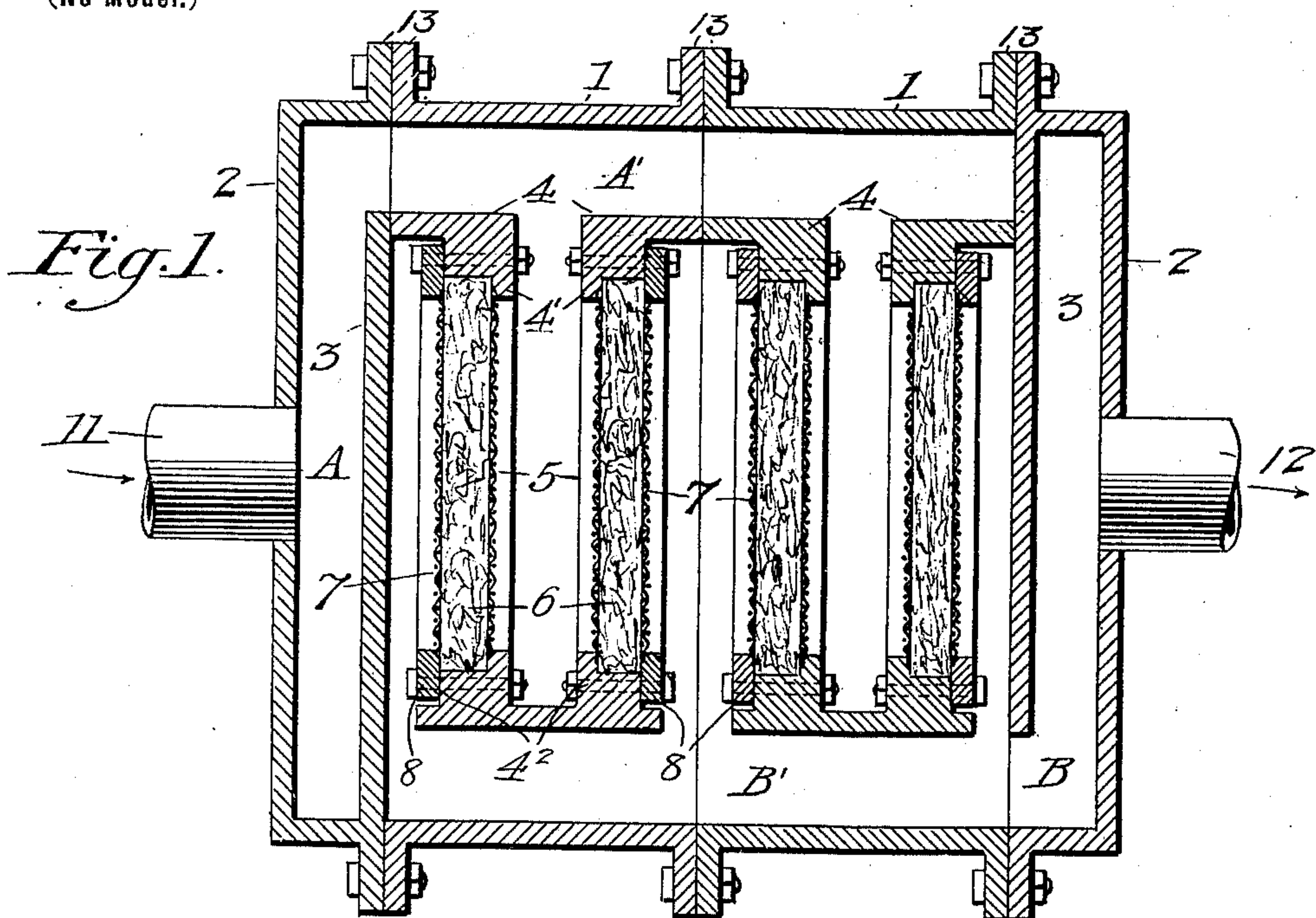
Patented Oct. 14, 1902.

G. C. STONE.

METHOD OF SEPARATING AND RECOVERING ARSENIC FUMES FROM FURNACE GASES.

(Application filed Oct. 29, 1901.)

(No Model.)



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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METHOD OF SEPARATING AND RECOVERING ARSENIC-FUMES FROM FURNACE-GASES.

SPECIFICATION forming part of Letters Patent No. 711,187, dated October 14, 1902.

Application filed October 29, 1901. Serial No. 80,451. (No specimens.)

*To all whom it may concern:*

Be it known that I, GEORGE C. STONE, a citizen of the United States, residing in Jersey City, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Methods of Separating and Recovering Fumes of Arsenic and the Like; 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.

My invention relates to the separation and recovery of fumes of arsenic and the like in the manufacture of sulfuric acid and sulfuric anhydrid from furnace-gases.

In the utilization of furnace-gases, particularly the gases evolved from ore-roasting furnaces, for the manufacture of sulfuric acid or sulfuric anhydrid the arsenic and other volatile products which would constitute objectionable impurities in the acid product must be removed before the synthetic production of the acid or the anhydrid is accomplished.

My present invention contemplates the removal of the fumes of arsenic and the like from furnace-gases by preliminarily cooling the gases to the point of deposition of said fumes and causing the cooled fumes to deposit or condense upon or within a body of filter material. The deposit of arsenic or the like of course may be recovered by subsequent treatment in any preferred manner.

In the accompanying drawings, wherein I have illustrated apparatus adapted for the practice of my invention, Figure 1 is a vertical cross-section through the condenser and separator, and Fig. 2 is a horizontal section taken at right angles to Fig. 1.

Referring to the drawings, the condenser and separator comprises a casing, preferably of metal, formed of central externally-flanged box-like sections 1, to which are secured end sections 2. Each of said end sections is provided with a wall or partition 3, the respective partitions terminating a short distance from the upper and lower walls of the casing, whereby an inlet-chamber A is formed in one head and an exit-chamber B is formed in the other head with the openings from said cham-

bers into the intermediate sections disposed at diagonally opposite points in the casing. A supply-pipe 11 connects the furnace or other source with chamber A, while an outlet-pipe B leads the purified gases to the oxidizing apparatus. The intermediate sections are secured to the end sections and to each other by suitable bolts passing through the abutting flanges 13. Each of said intermediate sections is provided with a series of internal flanges 4, which when the sections are joined together form a series of U-shaped pockets opening alternately toward the longitudinal channels A' B', communicating with the inlet and outlet channel A and B, respectively. Mounted in each of the rectangular frame-like structures formed by these flanges is a screen or condenser comprising a sheet of wire-gauze or the like 5, supported on the projecting rim 4' of the flanges 4, upon which sheet is placed a layer of filter material 6, preferably of asbestos or like refractory material, that is unaffected by heat or chemical action of the gases. This layer, which constitutes the condensing and separating medium proper, is secured in place by another sheet of wire-gauze 7, which in turn is held in position by a frame 8, attached to the flanges 4 by bolts. It will be seen that each intermediate section of the casing carries two screen or condenser sections with a space between them communicating with the gas-inlet, while the adjacent screens of contiguous sections form pocket-like recesses opening into the inlet-channel. The apparatus may be quickly dismantled for the purpose of removing one or all of the screen-sections or for the purpose of supplying additional or replacing old or damaged screens. Likewise separate casing-sections may be added to or removed from the apparatus to increase or diminish the capacity of the separator.

In applying this apparatus to the practice of my method the gases from the furnace are cooled to substantially the temperature of deposition of the fumes of arsenic and like volatile constituents. This cooling may be accomplished in any well-known manner. The mixed gases enter at 11, pass by way of chambers A and A' into the spaces between the screens 6, thence laterally through said



5 screens, where the arsenic and like volatile constituents are condensed and retained upon and within the body of the filter mass of the screen. The sulfur fumes which are not condensed at the temperature employed to separate the arsenic and other impurities pass through the separator-screens and by way of chamber B' B and exit-pipe 12 to the oxidizing apparatus, where the acid or the anhydrid is formed.

10 When the separator-screens have taken up sufficient quantities of condensed fumes, the apparatus is disconnected from the gas-supply and the acid-making apparatus for the purpose of removing the deposits of arsenic and the like from the screens and simultaneously cleaning and preparing the screens for further use. This is accomplished by heating the apparatus to a degree sufficient to volatilize the products deposited in and upon the screen or preferably by removing the screens and subjecting the filter material to the action of heat either to drive off the deposited matter or to separate and recover the various desirable elements, particularly the arsenic, by any of the well-known methods of fractional distillation, or instead of utilizing heat for the purpose the deposited material may be removed or recovered from the screens by washing or treating with suitable chemical reagents. After the screen material has been cleansed it is again applied to the apparatus and the operation repeated as often as necessary.

35 What I claim as my invention is—

1. In the manufacture of sulfuric acid and sulfuric anhydrid from furnace-gases, the method of preparing fumes of arsenic and the like for removal from said gases and then

removing and catching them, which consists in first cooling the gases to substantially the temperature of deposition of said fumes, thereafter admitting said gases into contact with a body of filter material and recovering the preliminarily-cooled fumes upon and within said material; substantially as and for the purpose set forth.

2. In the manufacture of sulfuric acid and sulfuric anhydrid from furnace-gases, the method of removing fumes of arsenic and the like from said gases, which consists in first cooling the gases to substantially the temperature of deposition of said fumes, and immediately separating and recovering said fumes upon and within a body of filter material, and subsequently recovering the said arsenic or the like from the filter-body; substantially as and for the purpose set forth.

3. In the manufacture of sulfuric acid and sulfuric anhydrid from furnace-gases, the method of removing fumes of arsenic and the like from said gases, which consists in first cooling the gases to substantially the temperature of deposition of said fumes, and immediately separating and recovering said fumes upon and within a body of filter material, and subsequently recovering the said arsenic or the like by subjecting the filter-body to the action of heat until the substances separated are again volatilized, and finally condensing the products of volatilization; substantially as and for the purpose set forth.

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

GEORGE C. STONE.

Witnesses:

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