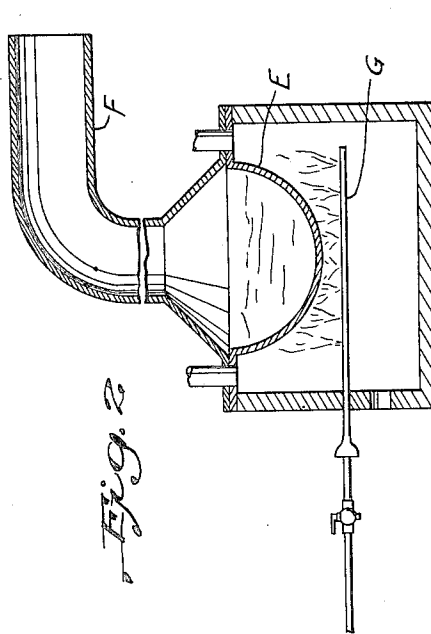
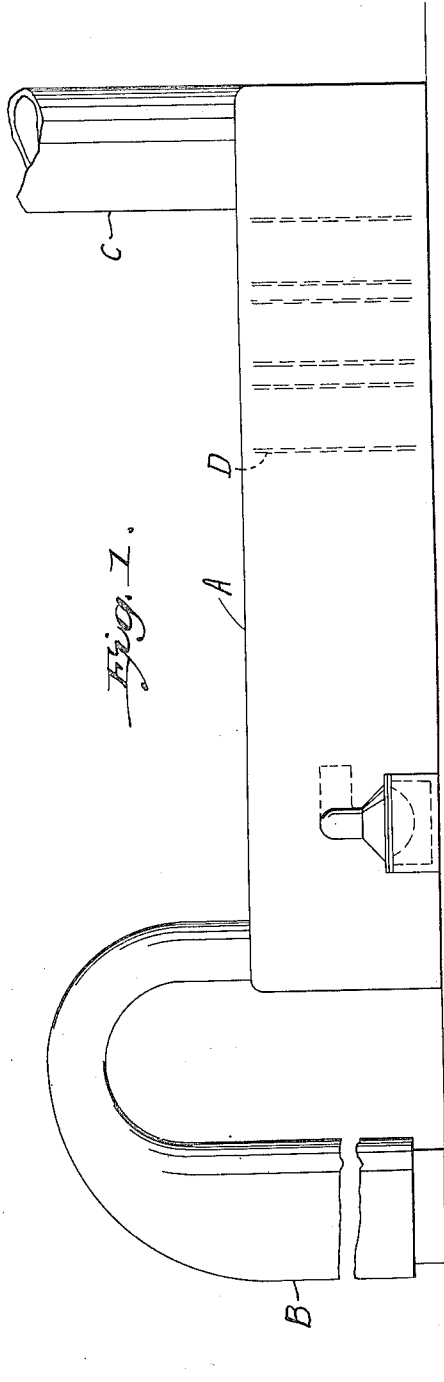


Jan. 9, 1923.

1,441,713.

H. A. PROSSER.
METHOD OF CONDITIONING GASES;
FILED JUNE 3, 1921.



INVENTOR
Herman A. Prosser
BY *Albert M. Austin*
ATTORNEY

UNITED STATES PATENT OFFICE.

HERMAN A. PROSSER, OF NEW YORK, N. Y.

METHOD OF CONDITIONING GASES.

Application filed June 3, 1921. Serial No. 474,799.

To all whom it may concern:

Be it known that I, HERMAN A. PROSSER, a citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Conditioning Gases, of which the following is a specification.

The invention relates in general to an improved method for conditioning gases in the art of electrically precipitating dry solids and other non-gaseous particles from gases.

In the art of electrical precipitation difficulty has been experienced in causing the solid matter in the gases under treatment to be deposited in commercial quantity on the electrode. Numerous attempts have been made to remedy this defect. For example, it has been suggested that the gases carrying the particles be showered with water, that the precipitated particles be sprayed as they form on the electrodes and that the electrodes be moistened with water and acid. However, there are serious objections to the formation of a wet, slimy precipitate, among others the difficulty of handling such slimes.

Recently it has been suggested to condition the electrodes themselves by periodically treating the same with a very thin coat of acid to keep them clean of insulating deposits and at the same time to avoid the formation of wet precipitates.

The present invention has for an object the providing of a simple method for effecting a constant, continuous and complete precipitation of the solids and non-gaseous particles from the gases, by an economic process of conditioning of the gases themselves in such a way that there will result a dry, readily handleable precipitate.

Still another object of the invention is to effect such action economically on a large commercial scale at a lower cost than similar treatments now used and by a process which can be practiced without necessity for interrupting the continuity of the treatment in order to condition the electrodes or the like.

Various other objects and advantages of the invention will be more fully set forth in the following particular description of one method for practicing the invention but it will be obvious that various modifications of the suggested method and different substi-

tutes for the ingredients suggested can be used.

I attain these objects simply by continuously introducing into the gas stream a conducting acid in extremely fine particles or rather in the form of a fume. It is vitally necessary in practicing this method that the acid be in such minute quantities, compared with the mass of gas treated, that the resulting precipitate be in a dry condition. Unless extreme care is exercised in the introduction of the acid fume, the acid particles will tend to collect on the solids present in the gas and will form drops on the electrodes with a resulting slimy precipitate which is the very thing that this invention is endeavoring to avoid.

In general the method is practiced by adding to the gas stream, before it reaches the Cottrell or equivalent electric precipitating treater, an acid in finely divided form or rather acid fumes, or other reagents which will react with the gas present to form an acid reaction, capable of increasing the conductivity of the solids or non-gaseous particles in the gas stream.

One method which has given entire satisfaction is to boil fuming sulphuric acid in a pan and permit the fumes to enter the conduit with the gases leading to the electric treater. It is suggested in the alternative that the acid be introduced into the gas conduit by some suitable form of atomizing device. By a suitable control usual in the practicing of metallurgical operations of this character, it is possible so to regulate the amount of conditioning acid introduced into the conduit compared to the amount of gas to be treated per unit of time, that there will be sufficient acid to cause the complete precipitation of all contained non-gaseous particles, but which will not be sufficient to form anything in the nature of a wet or even damp precipitate. It is to be appreciated that following these directions the amount of acid used is practically negligible and is barely perceptible in the treated gas.

In the accompanying drawings is shown one form of apparatus for carrying out the process, in which Figure 1 is a diagrammatic view in side elevation of a portion of a flue and a portion of the furnace pipe and stack;

Figure 2 is a sectional view of a boiling pan for forming the acid fumes,

As indicated in the drawings the flue A is interposed between the blast furnace indicated at B and the stack or chimney C. Apparatus to produce an electrostatic field is positioned at any suitable point within the flue as indicated at D. The boiling pan is located adjacent to the flue, preferably at a point spaced from the electrodes and comprises an enclosed pan or kettle E which communicates with the interior of the flue through an outlet pipe F. The pan may be heated and the acid caused to fume by the burners G or any other suitable form of heating means, the combustion products being removed in any suitable manner.

When the gas is so treated it will be understood that it is then passed through the electrostatic field formed by the energized electrodes in the manner which is well known in the practice of the Cottrell method. The nongaseous particles are precipitated from the gases, the gases passed from the electrostatic field practically clear, and this operation can be maintained continuously as there is no necessity for interrupting the gas flow for the purpose of conditioning the electrodes as is required in the practicing of other methods.

While sulphuric acid has been suggested due to its relative cheapness over other suitable treating liquids, it is obvious that other materials may be used and for an illustration of one such material reference is made to nitric acid.

Having thus described my invention, I claim:

1. In the art of electrical precipitation of suspended solid matter from a body of moving gases, the method which includes the step of continuously adding to the moving gas at a point spaced from the electrical field an acid conditioning agent in the form of a fume prior to subjecting the gases to the in-

fluence of the electrical precipitating agency.

2. In the art of electrical precipitation of suspended solid matter from a body of moving gases, the method of increasing the electrical conductivity of said gases which method includes the step of continuously adding to the moving gas acid fumes capable of increasing the conductivity of the solid particles in minute quantities insufficient to moisten the precipitate, whereby a dry precipitate is obtained.

3. In the art of precipitating suspended particles from moving gases by electrical action, the method of increasing the conductivity of the gases by adding outside of the electrical field a substantially anhydrous conducting liquid in minute quantities compared to the mass of gas treated thereby to maintain the gas in a dry state and then subjecting the gas so treated to the electrical action to effect precipitation.

4. In the art of precipitating suspended solid particles in a dry condition from gases by electric action, the method which consists in adding to all parts of the gases a minute quantity of an acid in the form of a fume at a point spaced from the electrical field, thereby to maintain the gas in a dry state.

5. In the art of precipitating suspended nongaseous particles in a dry condition from gases by causing them to pass through an electrical field, the method of conditioning the gases which consists in adding to the gases an acid fume at a point relatively remote from the electrical field in an amount sufficient to render the particles conductive and insufficient to cause the precipitated particles to become perceptibly moistened and thereby produce a dry precipitate.

Signed at New York, in the county of New York and State of New York, this 2nd day of June, A. D., 1921.

HERMAN A. PROSSER.