

No. 615,439.

Patented Dec. 6, 1898.

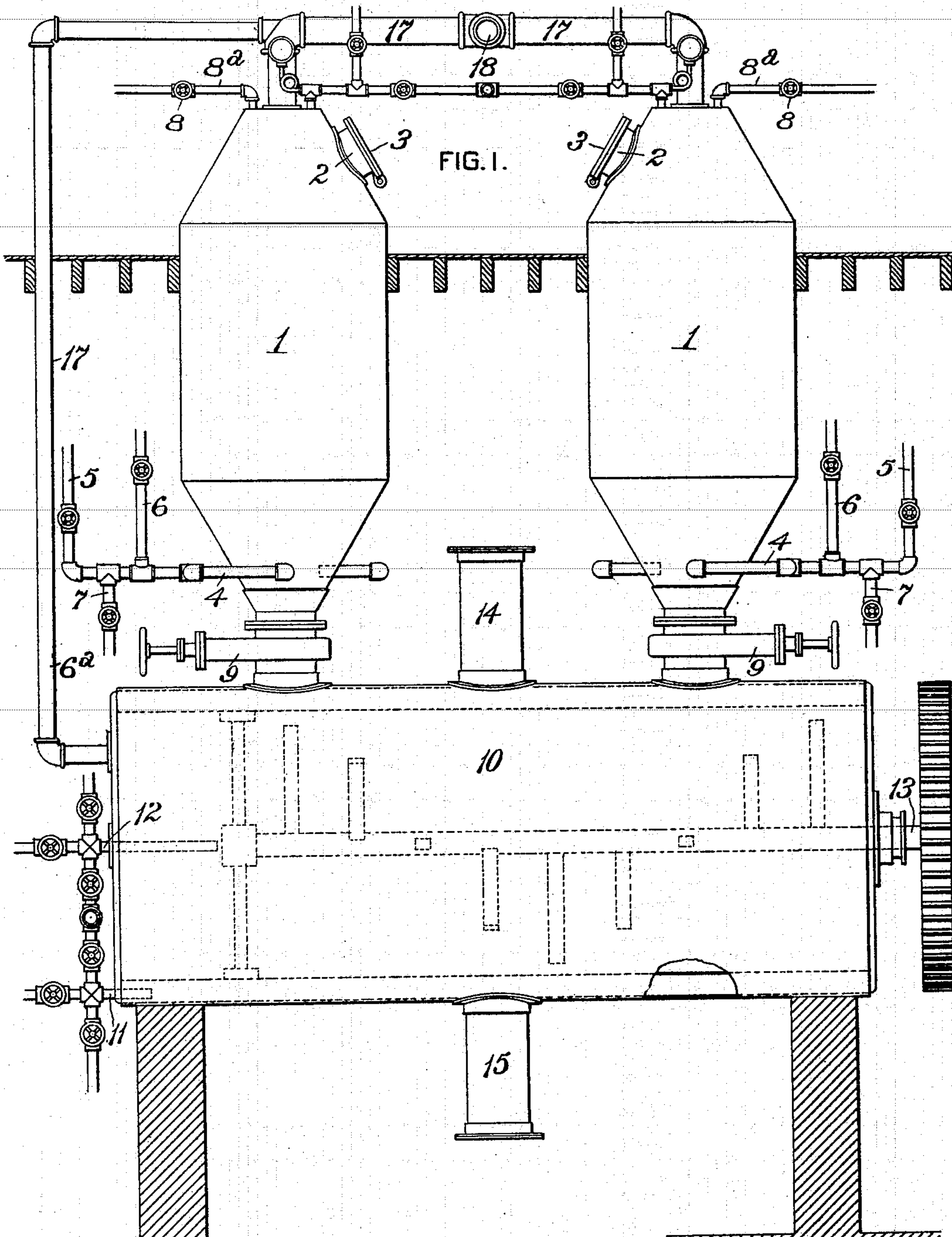
J. A. DUBBS.

PROCESS OF TREATING GARBAGE AND NOXIOUS GASES.

(Application filed Aug. 15, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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Jesse A. Dubbs
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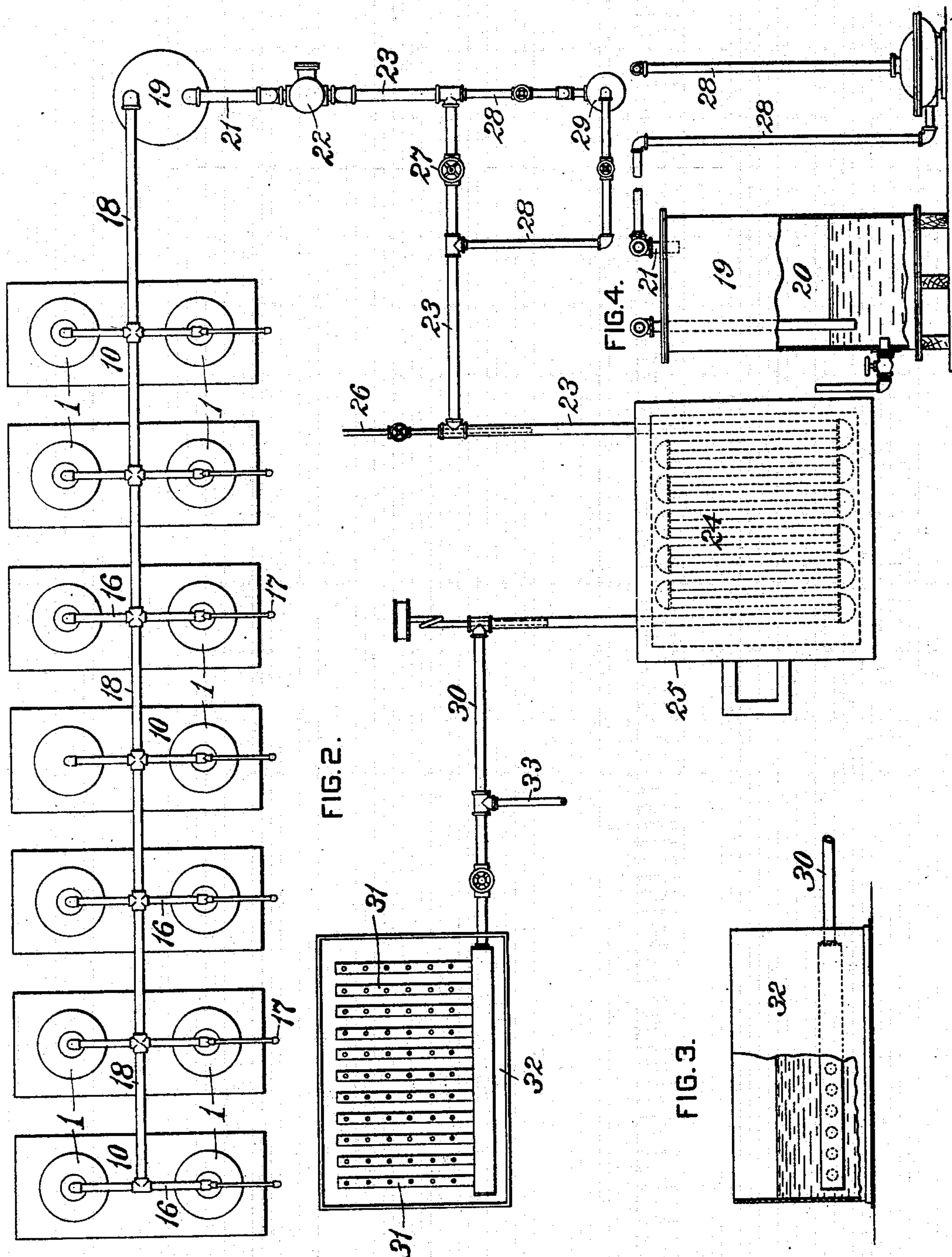
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WITNESSES:

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UNITED STATES PATENT OFFICE.

JESSE A. DUBBS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO WILLIAM FLINN, OF SAME PLACE.

PROCESS OF TREATING GARBAGE AND NOXIOUS GASES.

SPECIFICATION forming part of Letters Patent No. 615,439, dated December 6, 1898.

Application filed August 15, 1896. Serial No. 602,855. (No specimens.)

To all whom it may concern:

Be it known that I, JESSE A. DUBBS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Methods of Treating Garbage and Noxious Gases, of which improvement the following is a specification.

The invention described herein relates to certain improvements in the removal of the volatile and liquid portions of garbage and to the treatment of the noxious vapors evolved in such removal or extraction, the latter step being also adapted to the treatment of noxious gases from other sources.

In general terms the invention consists in the method hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of a form of apparatus employed in the practice of my invention. Fig. 2 is a top plan view of the apparatus. Fig. 3 is a view, partly in section and partly in elevation, of the scrubber; and Fig. 4 is a view, partly in section, of the condenser and meter.

In the application of my improvement to the treatment of garbage the latter is charged into the digesters 1 through the chutes 2, which are provided with covers 3, adapted to be hermetically secured on the chutes. Pipes 4 are connected to the lower ends of the digesters and also to pipes 5, 6, and 7. After the chute has been closed wet steam is introduced into the digesters through the pipes 5 and 4 for the purpose of cooking the garbage. After the garbage has been subjected to the action of wet steam for a certain length of time, which will vary with the character of the garbage, superheated steam is introduced through the pipes 6 and 4, the valve in the pipe 5 being allowed to remain open or closed at the discretion of the operator. The purpose of introducing the superheated steam is to more effectually extract the oil or grease, which would not be effected by the lower temperature of the wet steam. After the garbage has been thoroughly cooked the valves in the pipes 5 and 6 are closed and the valve 8

in the pipe 8^a opened, so as to admit highly-heated oxidizing-gases, such as superheated steam, into the top of the digester. The effect of this superheated steam is to oxidize or otherwise combine with the noxious gases in such manner as to render them practically odorless and innocuous. After the gases in the upper portion of the digesters have been subjected to the action of superheated steam the cover of the chute 2 is removed, so as to permit of the removal, by dipping or otherwise, of the grease and oil on top of the charge in the digesters. If desired, a preliminary drying of the garbage may be effected by opening the valve in pipe 7, thereby admitting hot air to the digesters.

In order to dry the cooked garbage and subject it to the necessary treatment for the manufacture of fertilizer, the valve 9 at the lower end of the digester is opened and the garbage discharged into the drying vessel 10, which is formed with an external shell or jacket, forming in connection with the internal shell a chamber for the reception of superheated steam or air. Highly-heated steam or air is led into the external chamber by a pipe 11 and into the inner chamber by the pipe 12 for the purpose of thoroughly drying the cooked garbage. For the purpose of disintegrating the garbage and facilitating the drying operation a shaft 13 is arranged in the drier, having its ends mounted in suitable bearings and provided with a series of radial arms. After the garbage is dried the phosphate stone and acid are charged into the drier through the chute 14, and after being thoroughly mingled with the garbage the whole is removed through the chute 15.

Each of the digesters and the driers is connected by branch pipes 16 and 17, respectively, to a common pipe 18, which is connected to a vessel 19, in which all particles of dirt and condensable vapors may be removed from the gases, the inlet-pipe 20 having its lower end submerged in a suitable liquid, as shown in Fig. 4. The exit-pipe 21 of the combined condenser and separator is connected to an exhaust-pump 22 of any suitable construction. The discharge-pipe 23 of the pump is connected to a coil of pipe 24, 100

arranged in furnace 25 of any construction suitable for heating the coil and gases passing therethrough. At any suitable point between the pump and coils a pipe 26 is connected to the pipe 23 for the purpose of mixing a gas containing an oxidizing agent, as steam, with the gases for the purpose of deodorizing and rendering the gases innocuous. The oxidizing and noxious gases are mingled in the coils in about the proportion of one volume of the oxidizing-gas to ten volumes of the noxious gases. In order to insure the mixing of the gases in the desired proportions, provision is made for measuring the noxious gases, when desired, by placing a valve 27 in the pipe 23 and forming a by-pass around said valve by pipes 28 and a meter 29, the pipes 28 being also provided with suitable valves. By this arrangement the noxious gases can be caused to pass through the meter at any time and the flow of oxidizing-gas regulated in accordance with volume of noxious gases flowing to the coils. The coils should be so heated that the gases are raised to such a temperature—i. e., about 1,000° Fahrenheit—as to effect an oxidizing of the noxious elements. If preferred, the oxidizing-gas may be raised to such a temperature prior to being mingled with the noxious gases that the heating-coils may be omitted. The exit-pipe 30 of the coils may be connected to one or more series of distributing-pipes 31, arranged in one or more tanks 32, containing suitable solutions which will serve to absorb the nitrogen gases, such as ammonia and cyanogen, or the exit-pipe 31 may be connected by branch pipe 33 to the pipes 11 and 12, leading to the drier, and the gases after being highly heated in the coils may be employed for drying the garbage.

While it is not possible to state the chemical actions which occur on the introduction of superheated steam into the gases evolved in cooking and drying the garbage, as the character of gases cannot be determined, it is certain the superheated steam effects such changes, separations, and recombinations that the gases, which are highly offensive and injurious, are rendered practically inodorous and inoffensive.

It is characteristic of my improved method that after the garbage has been charged into the digesters all gases are confined until subjected to such treatment as will render them innocuous, the liquids are changed to gases for treatment, and all gases are extracted from the solid material.

While my improvements are primarily applicable to the treatment of garbage and the gases generated during such treatment, it will be evident that noxious gases, however generated, can be similarly treated with like benefits.

I claim herein as my invention—
1. As an improvement in the art of treating

garbage the method herein described which consists in subjecting the garbage to a high heat for the purpose of extracting the liquids and gases therefrom, withdrawing the gases and subjecting such noxious gases to a temperature of about 500° Fahrenheit or greater, in the presence of an oxidizing-gas such as steam, whereby such gases are rendered innocuous, substantially as set forth.

2. As an improvement in the art of treating garbage the method herein described which consists in cooking the garbage for the purpose of extracting the liquids and gases therefrom, withdrawing the gases and subjecting the noxious gases to the action of a gas containing an oxidizing agent such as steam, at a temperature of about 500° Fahrenheit or greater, whereby the gases obtained from the garbage are rendered innocuous, substantially as set forth.

3. As an improvement in the art of treating garbage the method herein described which consists in forcing steam through the garbage, drying the solid portion of the steamed garbage, and subjecting the gases evolved during the steaming and drying operations to a temperature of 500° Fahrenheit or greater in the presence of a gas containing an oxidizing agent such as steam, whereby the gases will be rendered innocuous, substantially as set forth.

4. As an improvement in the art of treating garbage the method herein described which consists in cooking the garbage with steam, mingling steam with the gases and vapor evolved during the cooking operation, and then subjecting the mingled gases and steam to a temperature of 500° Fahrenheit or greater, whereby the gases will be rendered innocuous, substantially as set forth.

5. As an improvement in the art of treating noxious gases, such as are generated from garbage, the method herein described which consists in subjecting such noxious gases to a temperature of 500° Fahrenheit or greater in the presence of a gas containing an oxidizing agent such as steam, whereby the gases will be rendered innocuous, substantially as set forth.

6. As an improvement in the art of treating garbage the method herein described which consists in removing the liquid and volatile portions of the garbage, drying the solid portions of the garbage, and deodorizing and disinfecting the garbage by forcing a gas containing an oxidizing agent as an element or constituent thereof heated to a temperature of 500° Fahrenheit or greater, through the garbage, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JESSE A. DUBBS.

Witnesses:

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F. E. GAITHER.