

(No Model.)

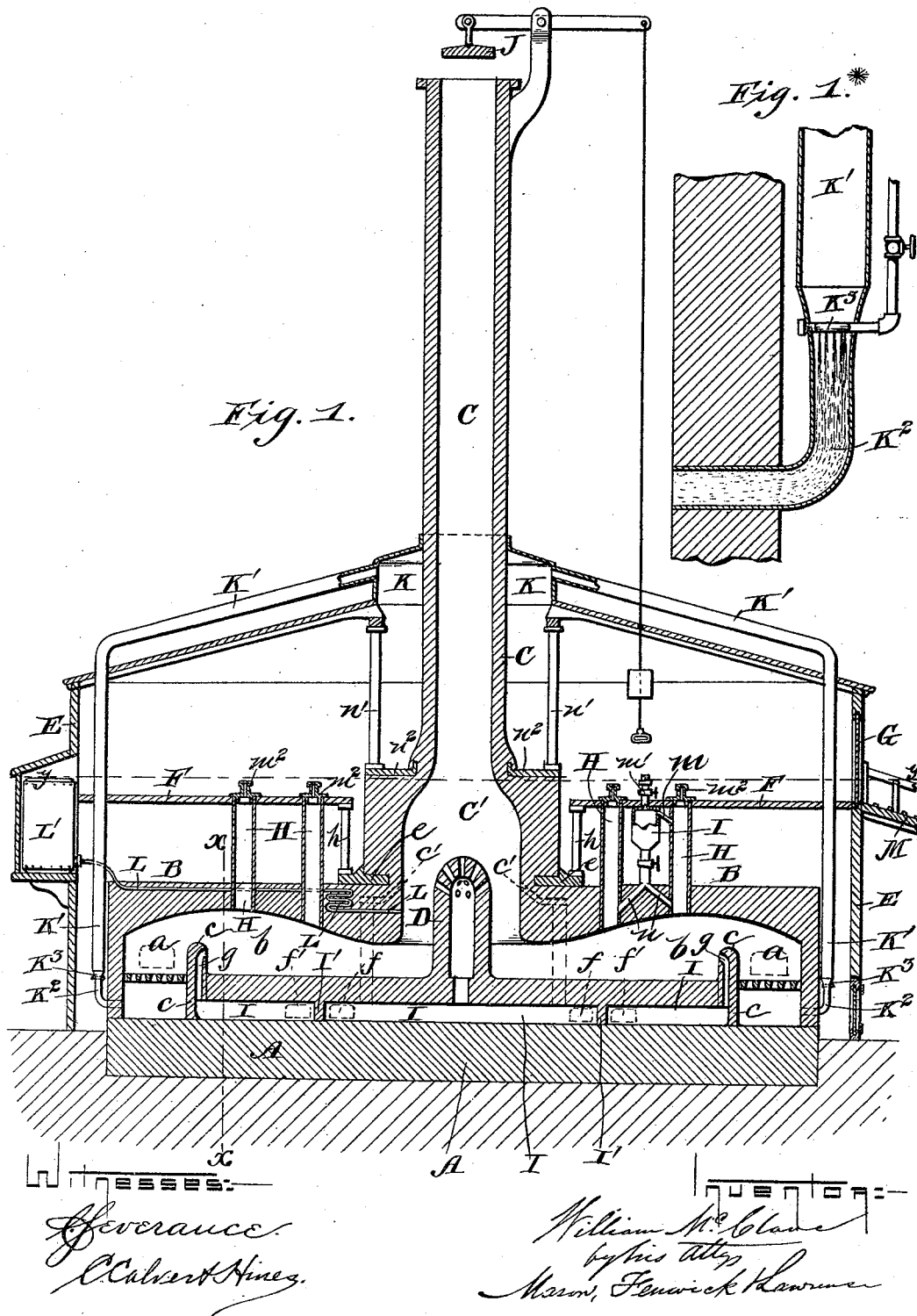
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W. McCLAVE.

FURNACE FOR BURNING GARBAGE, &c.

No. 490,582.

Patented Jan. 24, 1893.



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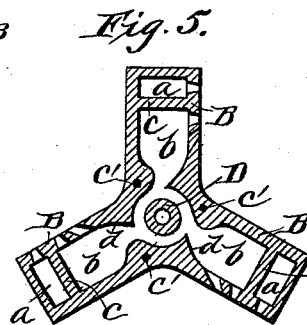
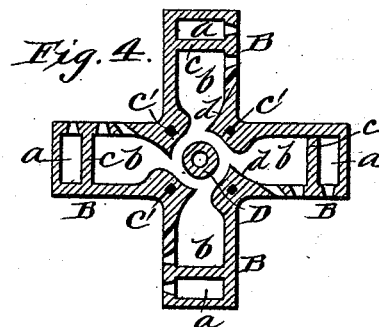
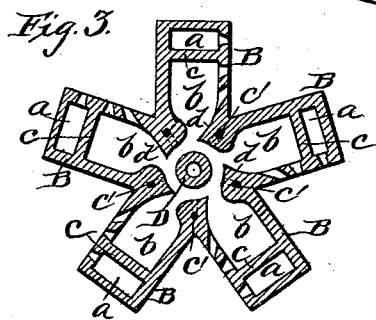
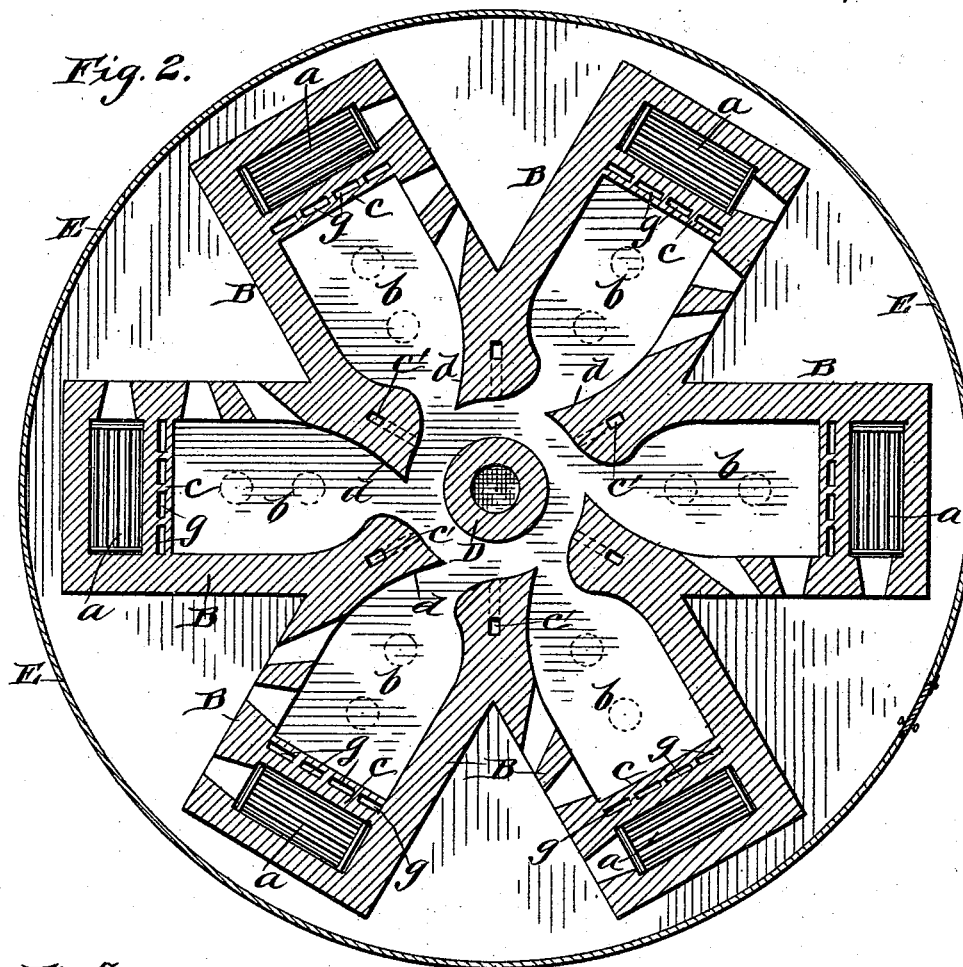
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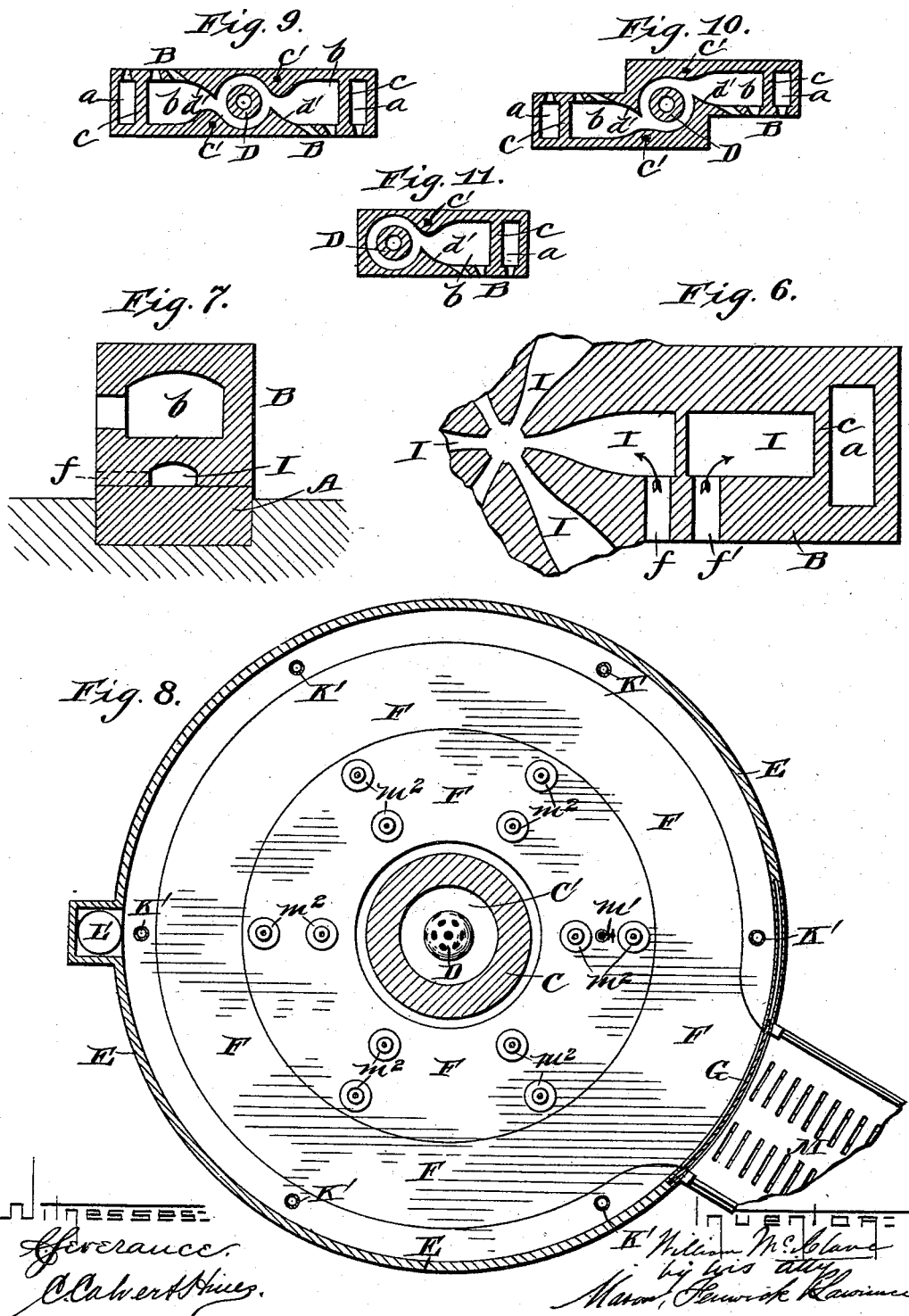
Witness:  
Clarence A. Clark

Witness:  
William McClave  
by his attys  
Mason, Fenwick & Lawrence

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# UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF SCRANTON, PENNSYLVANIA.

## FURNACE FOR BURNING GARBAGE, &c.

SPECIFICATION forming part of Letters Patent No. 490,582, dated January 24, 1893.

Application filed October 20, 1892. Serial No. 449,503. (No model.)

### *To all whom it may concern:*

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces for Burning Garbage, Night-Soil, and other Offensive Substances; 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 furnaces for burning garbage, dead animal matter, night soil and other offensive substances; and its objects are, to consume the same, and destroy the life germs and the odors from such substances, and thus avoid the nuisance arising from their escape to the atmosphere at the top of the stack or at points below the top of the stack; and to facilitate the introduction of the substances to the furnace.

My invention consists in a furnace having, in combination, a central column constructed of a refractory material, a stack, a main lateral combustion chamber in communication with a secondary circular gas combustion chamber in the base portion of the stack; and a suitable system of passages for air, to facilitate combustion, and for the introduction of the offensive substances to be burned, into the main combustion chamber forward of the initial or firing portion of said chamber.

My invention also consists in a furnace having, in combination, a central stack having a secondary circular combustion chamber in its base portion and concentric with said stack, a plurality of main combustion chambers in communication with said circular combustion chamber and with one another, and a suitable system of passages and channel-ways for supplying heated air to facilitate combustion; and also passages with closed tubes and reservoirs for the introduction of the offensive substances to be burned, into those portions of the main combustion chambers which are forward of the bridge walls between the said main chambers and the initial or firing portions of said chambers.

My invention also consists in a novel curved

or angular form of the neck or inner terminus of the side walls of the main lateral combustion chamber or chambers, in combination with a central column constructed of a refractory material and extending up from the bottom of the furnace, and a circular stack having a secondary circular combustion chamber at its base, whereby the flame from the lateral combustion chamber or chambers is caused to have a whirling or cyclonic movement as it passes into the circular combustion chamber or chambers of the stack, and thus the gases and unignited portions of matter carried by them from the chambers in which the substances are consumed, are separated and the same disintegrated and placed in a condition for having sufficient oxygen brought in contact with them to insure their complete combustion in the circular combustion chamber.

My invention also consists in a novel combination of odor conducting pipes with the highest portion of the building containing the furnace, and the ash pits of the initial or firing chambers, whereby any odorous gases and vapors arising in said house are conducted with the blast into the fires, and destroyed.

My invention also consists in a novel combination of passages for introducing garbage and dead animal matter, with passages for introducing nightsoil and the like into the furnace, whereby the odors from the nightsoil are conducted into the main combustion chambers during the feeding of the same into said chambers.

My invention also consists in a novel arrangement of heated air channel-ways, whereby the main combustion chambers, and the secondary circular combustion chamber and the refuse chamber between said combustion chambers, are supplied separately with heated air from hot air channel-ways beneath the furnace, the air being heated by heat radiated downwardly from the combustion chamber or chambers of the furnace.

My invention also consists in the combination with the main combustion chambers of the furnace and secondary circular combustion chamber of the stack of the furnace, said

furnace being constructed substantially as hereinafter described, of an auxiliary fuel supplying means, consisting of a petroleum oil tank and a supply pipe thereof leading into the said chamber, whereby, if occasion requires, the gases in said circular combustion chamber can be supplied with a highly inflammable vaporized fuel, which will insure their perfect ignition and combustion; and also the thorough disintegration and heating of all the vapors to a very high temperature; and of the life of germs and the odors in the gases and vapors being completely destroyed.

My invention also consists in the combination of a hollow perforated central column, a stack, lateral fire chambers, and air channel-ways beneath the furnace, whereby heated air is supplied to the burning gases in the secondary, circular combustion chamber.

In the accompanying drawings, Figure 1 is a vertical central section of my improved furnace complete, and inclosed within a building. Fig. 1\* is an enlarged detail view of a steam and air blast duct of the ash pit, the same being shown in connection with the steam and the air conducting pipes. Fig. 2 is a horizontal section of the furnace and building on a plane running through the lateral combustion chambers. Figs. 3, 4 and 5 are horizontal sections showing different geometrical forms in which the furnace may be constructed with combustion chambers. Fig. 6 is a broken horizontal section of the furnace on a plane running through the air channel-ways beneath the bottom of the combustion chambers. Fig. 7 is a cross section in the line  $x x$  of one of the lateral combustion chambers and its bed or base. Fig. 8 is a horizontal section in the line  $y y$  of Fig. 1. Figs. 9, 10 and 11 are horizontal sections showing three other different geometrical forms in which the furnace may be constructed; and also showing a slight change in the form of the side walls for producing, in connection with the central column, the whirling or cyclonic movement of the gases of combustion.

A in the drawings indicates the foundation of the furnace.

B are main lateral combustion chambers; C the central stack; D the central column; E the inclosing house and F the platform forming the roadway from the door G, for vehicles around the stack to the different passages H, I, for garbage, dead animals and offal. The combustion chambers are divided into two compartments  $a$ , and  $b$ , by a bridge wall  $c$ ; and in the initial or firing compartment  $a$ , a grate is placed and from this compartment the flame from the fuel on the grate passes over the bridge wall into the compartment  $b$ . The inner sides of the side walls are, at their inner termini  $d$ , curved so as to turn the flame tangentially or nearly so, toward the central column or nearly so, and thus cause it on striking said column to whirl or have a cy-

clonic movement in its upward progress; thus acting upon the gases or particles of matter and bodies of vapor causes them to be changed from their fixed condition and to be exposed universally to the action of the flames and the heated air and the gases to become fully ignited, and all the vapors to be thoroughly disintegrated and heated to a very high temperature, and the life germs and odors in the gases and vapors to be destroyed completely. At the bottom of the stack an enlargement is made and in this enlarged part a secondary circular combustion chamber is formed, in which the gases, as they whirl upward, are burned.

In Figs. 9, 10 and 11, the side walls are shown curved at  $d'$  so as to turn the gases against the surfaces of the walls partly surrounding the column, and thus the whirling or cyclonic movement is produced by said partly surrounding walls and the column, instead of only by direct contact with the column. It might be practicable to make the neck or curved termini of the lateral combustion chambers angular instead of curved.

The air for promoting combustion is introduced through passages  $f f'$ , closed by doors or registers, into channel-ways I, partitioned at I', said channel-ways being beneath the furnace bottom; and from these channel-ways it passes, after being heated by the furnace, on one side of the partitions into the lateral main combustion chambers by means of vertical passages  $g$  in the bridge walls  $c$ ; and on the other side of the partitions into the hollow column D and therefrom into the circular combustion chamber C'; it also passes into said circular combustion chamber by means of passages  $g'$  in the vertical and top walls of the furnace.

In operating this furnace it is preferable to supply air for combustion in the initial fires, by a forced (under-grate) blast, preferably steam jet blowers, from the fact that a forced blast will give a greater projective force horizontally to the flames at the point where they are contracted in the neck or necks or termini of the lateral chambers before they enter the central combustion chamber, and therefore produce a cyclonic action better than what would be produced by either a natural stack draft or a forced suctional draft in the stack; but, if desired, the blast for the initial fires may be drawn down from the top of the building by means of a fan blower or blowers and injected into the inclosed ash-pits of the said fires.

The platform or roadway F is constructed some distance above the top of the combustion chambers. This platform is supported at its inner edge by means of pillars  $h$ , said pillars resting on strong foot plates  $e$  let into the body of the furnace, and by the walls of the building at its outer edge. Through this platform or roadway the garbage or animal

matter-receiving tubes and nightsoil reservoirs, are passed, as indicated at H and I, and the former are extended into the combustion chambers, some of these garbage tubes being  
 5 connected with the nightsoil reservoirs by means of air vents *m* and the reservoirs with the garbage tubes by means of conducting passages *n*, said passages first passing the  
 10 nightsoil into the tubes and therefrom into the combustion chamber. The nightsoil is passed into the reservoirs by opening a cock *m'*, and the garbage into the tubes by removing caps *m''*. When the nightsoil enters the  
 15 reservoirs the expelled air flows into the tubes, and during the burning of the same any odors arising will have freedom to circulate through the reservoirs and tubes and pass back into the combustion chambers.

The building E has its roof sustained at its  
 20 inner edge by columns *n'*, resting on foot plates *n''* let into the walls forming the base of the stack. At the top of the stack a draft regulation damper J is applied, and this  
 25 damper is operated by a rod or chain leading through the roof of the building. At the center of the roof of the building a circular chamber K is formed, and from this chamber  
 30 pipes K' are extended down into the ducts K<sup>2</sup> of the steam blower K<sup>3</sup> at the ash pits of the initial or firing chambers, and by this arrangement the odors within the building are  
 35 forcibly conducted into the fire and consumed. In order to assist in the combustion of the gases in the circular combustion chamber C', a petroleum oil conducting pipe L is  
 40 constructed in the top wall of the furnace so as to be in communication with the said circular combustion chamber. This tube is connected with an oil tank L situated on a  
 45 stand within a projection of the building, as shown. By introducing petroleum oil into the circular combustion chamber, as an auxiliary fuel, at times when all the garbage fur-  
 50 naces are charged with wet substances, the intensity of the fire will be increased at this point, and the gases which may, from such  
 55 cause, be at a low temperature, may be quickly raised to a high temperature by the quick action of the hydrocarbon flame and be completely consumed. The offal to be  
 burned is hauled up the inclined gang-way M and carried through the door G upon the platform, and dumped upon the same in proper relation to the charging tubes and res-  
 60 ervoirs.

In Fig. 11, I have shown the furnace with a single lateral combustion chamber, and in  
 65 Figs. 9 and 10 it is shown with two combustion chambers, while in Figs. 1, 2, 3, 4 and 5 I have shown it with three, four, five and six combustion chambers. All of these forms embody the construction and combination by which the whirling or cyclonic action of the gases is produced, and, therefore, my invention  
 70 admits of any of these forms and constructions being adopted, and, if desired, the num-

ber of combustion chambers may be greater than six.

What I claim as my invention is:—

1. A furnace having, in combination, a stack  
 70 mounted on its top, a central column of refractory material extending up from its bottom, a main lateral combustion chamber, a circular combustion chamber in the base of  
 75 the stack, and a suitable system of hot air channel-ways for supplying air to facilitate combustion, and charging passages for the introduction of garbage or dead animal matter, or nightsoil and the like, into the main combustion chamber, substantially as described. 80

2. A furnace having, in combination, a central stack mounted on its top and constructed with a circular combustion chamber in its base and concentric with said stack, a plurality of lateral combustion chambers in com-  
 85 munication with said circular combustion chamber, and a system of passages and channel-ways for supplying heated air to facilitate combustion, and also passages inclosed by  
 90 suitable reservoirs or tubes for the introduction of the offensive substances into the furnace to be burned, substantially as described.

3. A furnace having, in combination, lateral combustion chambers, the side-walls thereof  
 95 being curved at the inner terminus or termini so as to tangentially, or nearly so, deflect the flowing gases or flames; a stack having a circular combustion chamber in its base, a central column of refractory material extending up from the bottom of the furnace,  
 100 whereby the gases are caused to whirl or have a cyclonic action, and are expanded and thoroughly intermixed with heated air, and all the vapors thoroughly disintegrated and heated to a very high temperature at the  
 105 point where the heat is the greatest, and the life germs and odors in the gases and vapors destroyed substantially as described.

4. The combination of the odor conducting pipes with the interior chamber of the build-  
 110 ing containing the furnace, and with the steam and air blast ducts of the ash pits of the furnace, substantially as described.

5. The combination with the charging passages of the furnace, of the tubes for the in-  
 115 troduction of garbage or dead animal matter, and the reservoirs for nightsoil and the like, said tubes and reservoirs being connected by air vents and conducting channels, substantially as described. 120

6. The furnace having a primary and a secondary combustion chamber with a refuse chamber between them and constructed with the hot air channel-ways beneath its bottom, and with air entrance passages, and branch  
 125 passages leading into the several chambers, substantially as described.

7. The combination with the primary and secondary combustion chambers and the refuse chamber of the furnace, the latter having  
 130 a tangential discharging throat, of the central column extending up into the secondary

combustion chamber, and; a petroleum oil tank and the supply pipe thereof leading into the said secondary combustion chamber, substantially as described.

- 5 8. The furnace having, in combination, the lateral combustion chamber, a stack having a circular combustion chamber, a hot air channel-way beneath the furnace bottom, and a hollow perforated central column extending

up from the bottom of the furnace and in communication with the hot air channel-way, substantially as described. 10

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

WILLIAM McCLAVE.

Witnesses:

C. SEVERANCE,

C. CALVERT HINES.