(No Model.)

3 Sheets—Sheet 1.

T. P. MAHON.

FURNACE FOR BURNING REFUSE MATTER.

No. 523,478. Patented July 24, 1894.

Fig. 1.

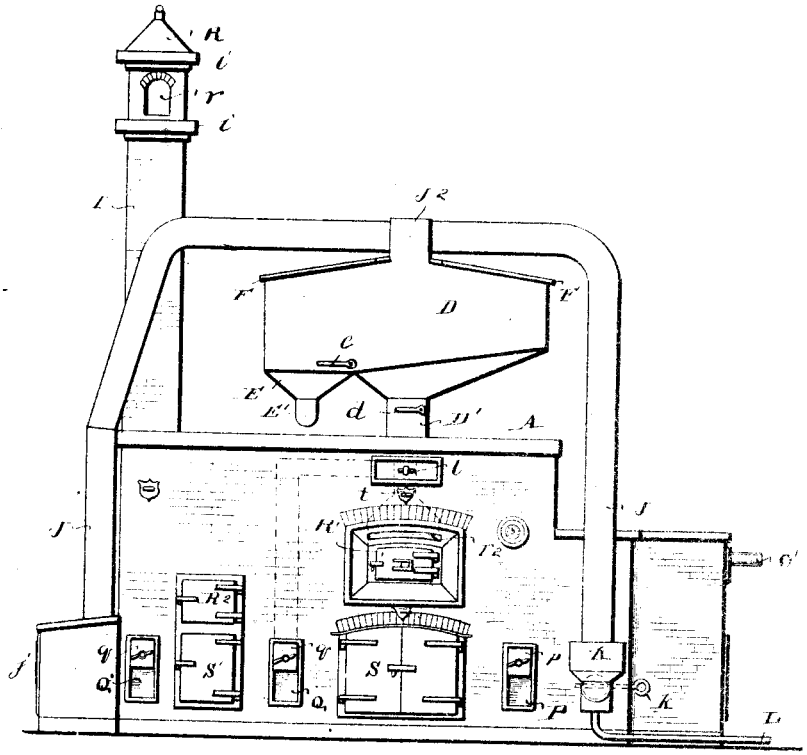


Fig. 2.

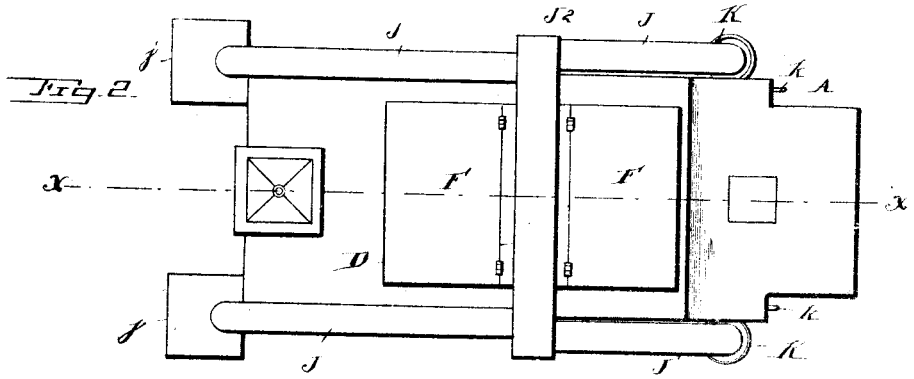
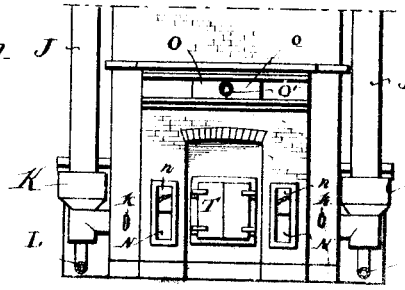


Fig. 3.



Witnesses:

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C. A. Dutlinger

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Attorney.

(No Model.)

3 Sheets—Sheet 2.

T. P. MAHON.

FURNACE FOR BURNING REFUSE MATTER.

No. 523,478. Patented July 24, 1894.

Fig. 4.

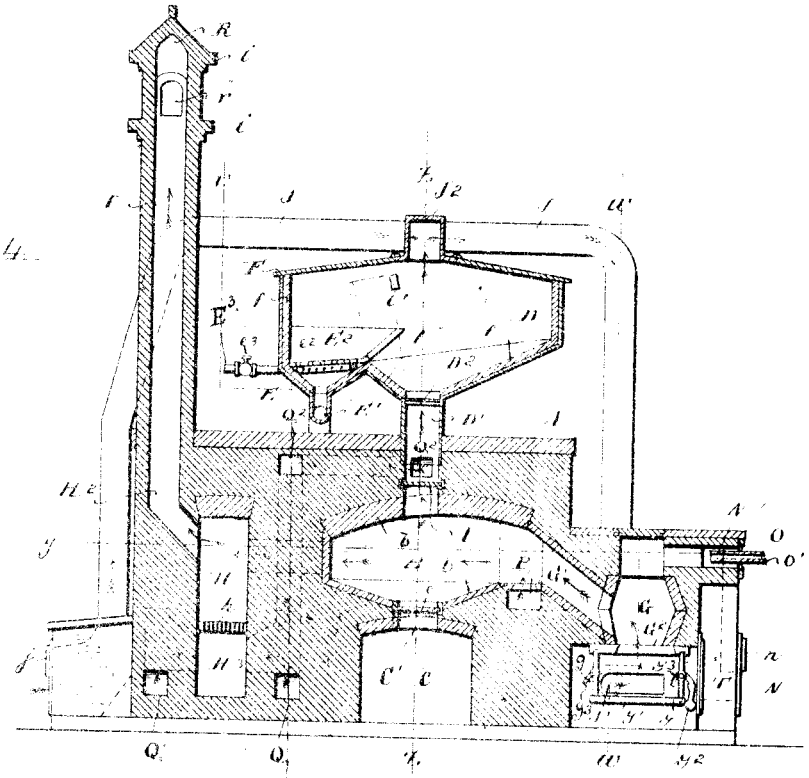
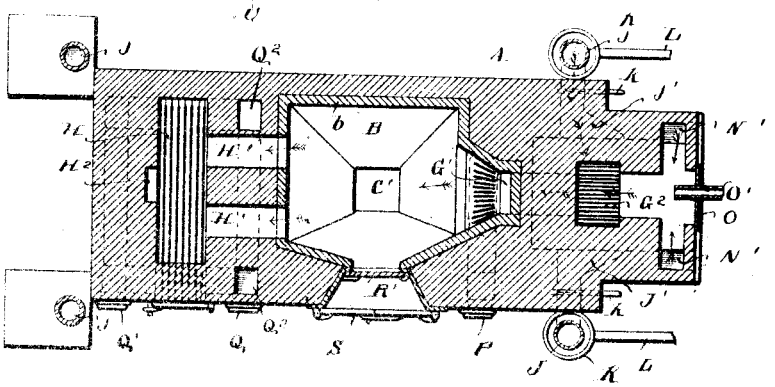


Fig. 5.



Witnesses
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(No Model.)

3 Sheets—Sheet 3.

T. P. MAHON.

FURNACE FOR BURNING REFUSE MATTER.

No. 523,478. Patented July 24, 1894.

Fig. 6.

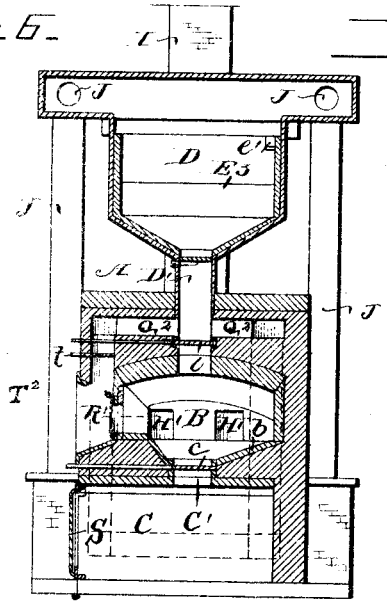


Fig. 7.

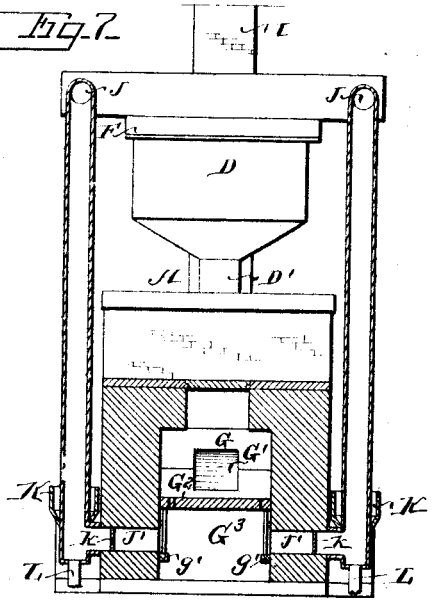


Fig. 9.

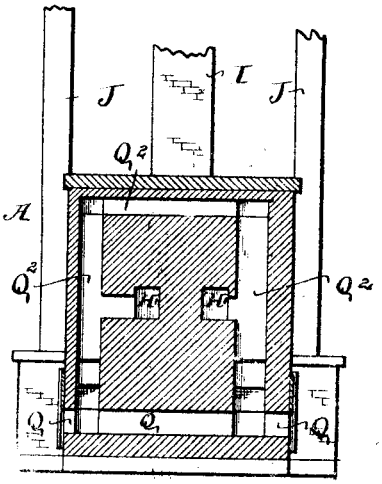
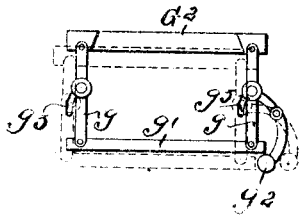


Fig. 8.



Witnesses:

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Lawrence P. Mahon

By

Attorney.

UNITED STATES PATENT OFFICE.

TERRENCE P. MAHON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO DARWIN E. CROSBY, OF SAME PLACE.

FURNACE FOR BURNING REFUSE MATTER

SPECIFICATION forming part of Letters Patent No. 523,478, dated July 24, 1894.

Application filed June 26, 1893. Serial No. 478,819. (No model.)

To all whom it may concern:

Be it known that I, TERRENCE P. MAHON, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Furnaces for Burning Refuse Matter, of which the following is a specification.

My invention relates to furnaces for burning refuse matter, and consists of certain improvements which are fully set forth in the following specification, and are shown in the accompanying drawings.

My improved furnace is designed for burning all manner of refuse matter, such as garbage, sewage, &c., so that a practically complete combustion of the refuse is accomplished and the escape of noxious vapors and foul odors is prevented. Such an apparatus may be employed in large cities for the destruction of waste matter, without the dissemination of foul odors and unwholesome gases.

My invention relates to certain improvements in the construction of the furnace for the purpose of producing a more complete combustion of the refuse matter and of preventing the escape of noxious odors and vapors into the atmosphere.

Another feature of my invention relates to the employment of condensing devices with the draft flue, or flues, whereby animal or vegetable oils held in suspension in the vapors or gases may be reclaimed.

My invention also relates to various improvements in construction and to novel combinations of parts which are hereinafter fully described and claimed.

I shall now refer to the accompanying drawings for the purpose of explaining my invention.

Figure 1 is a side elevation of my improved furnace. Fig. 2 is a plan view of the same. Fig. 3 is a front elevation of a portion of the same. Fig. 4 is a longitudinal vertical sectional view on the lines *x—x* of Fig. 2. Fig. 5 is a longitudinal horizontal sectional view on the line *y—y* of Fig. 4. Fig. 6 is a transverse vertical sectional view of the furnace on the line *z—z* of Fig. 4. Fig. 7 is a similar sectional view on the line *w—w* of Fig. 4. Fig. 8 is an enlarged side elevation of the rocking fuel grate; and Fig. 9 is a transverse vertical sectional view of the furnace on the line *v—v* of Fig. 4.

A is the body or structure of the furnace which may be of any suitable construction. B is an internal incinerating chamber which may be lined with fire brick walls *b*.

C is an ash pit below the chamber B with which it communicates through a suitable opening C′ provided with a door or trap *c*. The base or floor of the incinerating chamber is preferably inclined toward the opening C′ so as to form a hopper to guide the ashes to the opening.

D, is a tank, hopper or reservoir to receive the refuse matter located preferably above the structure or body A and communicating with the incinerating chamber B through a flue or passageway D′.

D^2 is a door in the passageway D′ closing the opening from the hopper D to the passageway D′. This door may be operated from the outside of the hopper by a lever or handle *d* which may be suitably weighted to keep the door closed when desired. (See Fig. 1.)

E is an auxiliary hopper communicating with the hopper D and having an outlet through a passageway E′ to the sewer.

E^2 is a receiving box located over the hopper E and hinged adjacent to the hopper D and adapted to be elevated or raised as shown in dotted lines in Fig. 4. The box E^2 is provided with a perforated bottom e^2. The box E^2 may be operated from the outside of the hopper by a handle *e* (see Fig. 1). A suitably located stop *e′* may be employed to limit the movement of the box E^2.

E^3 is a perforated water pipe located in the hopper E preferably immediately below the movable tank or box E^2 and extending about the hopper. By this pipe E^3 water may be supplied to the hopper E when desired. The pipe E^3 may be provided with a suitable valve e^8 to control the flow of water.

The hopper D may be provided with air tight doors F, F and may be constructed of metal with a fire proof lining *f*.

G is the fire box located in the front of the structure A and communicating with the incinerating chamber B through a flue G′.

G^2 is the grate within the fire box G.

G^3 is the ash pit below the grate G^2.

I prefer to support the grate G^2 upon rocking bars g which may be connected at the bottom by links g', so that by operating the bars g the grate G^2 may be rocked. The forward bar g may be connected with one or more pivoted counter-weighted levers g^2 by which the rocking of the bars may be accomplished and by means of which the grate may be brought and maintained in a normal raised position. The rear rocking bar g may have its ends supported in slots g^3 in the rear of the side walls of the ash pit which act to support the rear of the grate and guide it when it is moved under the rocking action imparted to it by the pivoted lever or levers g^2. (See Fig. 8.)

H is a second chamber located in the rear of the incinerating chamber D and communicating therewith through a flue or flues H' and also with the chimney I through a flue H^2. The chamber H is provided with a grate h.

H^3 is the ash pit of the chamber B below the grate h.

J, J are the air supplying flues which lead from inlets j, j in the rear of the furnace to the hopper D and thence to the front of the furnace which they enter through flues J', J' below the grate G^2.

In the drawings I have shown the flues J, J connecting with the hopper D through a head J^2. The quantity of air entering through the flues J, J may be regulated by opening or closing the inlets j, j.

K, K are condensing heads surrounding the flues J, J for condensing the vegetable or animal oils held in suspension in the air and vapor conducted from the hopper D by the flues J, J.

L, L are pipes leading from the flues J, J below the condenser heads for carrying off the condensed oils.

The heads K, K may be packed with ice or refrigerated in any other suitable manner for the purpose of producing the condensation in the pipes J, J.

Instead of heads K, K any other suitable condensing device may be employed.

The inlet flues J', J' may be provided with suitable dampers k, k.

N, N are air inlets in the front of the furnace structure to flues N' N' which lead up to the fire box G above the grate G^2 for the purpose of supplying air above the grate.

The air inlets N, N or the flues N', N' may be provided with suitable doors or dampers n.

O is an inlet in the front of the furnace structure for introducing air directly into the fire box above the grate.

The inlet O may be provided with a suitable door or damper o.

O' is a blast pipe entering the inlet O by which a blast of air or steam may be blown into the furnace through the inlet O. When the inlets n, n are open such blast acts also to draw air in through the flues N', N'.

P is a flue leading from the outside to the incinerating chamber B, preferably adjacent to the flue G' for supplying air directly to the chamber B.

The flue P may be provided with a suitable door or damper p.

Q, Q' are flues leading from the outside to the second chamber H opening to the ash pit H^3 below the grate h. These flues may be provided with suitable doors or dampers q for controlling the supply of air.

Q^2 is a connecting flue leading from the pipe D' to the chamber H. The pipe D' may be provided with a suitable damper l to control the passage of currents from the chamber B through the flue Q and also to the tank or hopper D.

The smoke stack I is preferably provided with a closed cap R upon its top and with side apertures r so that heated air will be contained within the cap above the openings r. The top of the stack I is also preferably provided with ledges i above and below the openings r to prevent the entry of air currents into the openings r and the down drafts that would result therefrom.

The chambers B and H are provided with suitable fire doors R', R^2 and the ash pits C and H^3 with ash doors S, S'.

T is the door in the front of the furnace structure for charging the grate G^2 and removing the ashes from the pit G^3.

T^2 is a flue leading from above the furnace door R' to the flue D^2 and is provided with a suitable damper t. When the door R' is to be opened this flue T^2 may be opened to induce an ingoing draft and thus prevent hot air and odors blowing out through the door R'.

I shall now describe the operation of my incinerating furnace. Fire is built upon the grate G^2 which receives its draft from the inlets j, j in the rear of the furnace through the flues J, J. The products of combustion from the grate G^2 pass through the flue G' into the incinerating chamber B and thence through the flues H' into the second chamber H. In this second chamber H, a second fire is built upon the grate h which receives its draft through the flues Q, Q'. The products of combustion from the chamber B combine with those from the chamber H and are thoroughly consumed. The garbage or refuse matter to be consumed is emptied into the hopper D through one of the doors F, and when the trap or door D^2 and the damper l are opened it drops through the passage or pipe D' into the incinerating chamber B where it is subjected to the heat from the fire on the grate G^2 and becomes consumed. The smoke and unburned particles of matter which pass off from the chamber B enter the second chamber H where they are directly subjected to the fire upon the grate h and are fully consumed so that substantially no unconsumed particles of garbage and refuse matter with the resulting foul odor escape from the stack I into the atmosphere. When the damper l and door D^2 are opened to permit the refuse

matter from the tank D to pass into the chamber B; the products of combustion pass from the chamber B through the flue D′ into the tank D and thus partially consume the refuse matter in the tank even before it passes into the chamber B. The result of this operation is that the passage flue D′ will not become clogged by large pieces of refuse lodging in it. The heat and flames from the chamber B partially consume such matter so that it can fall freely into the incinerating chamber. The tank D thus becomes highly heated and is discharged with great rapidity. The hopper or tank D is thus a primary incinerating chamber in which the matter is partially consumed before it enters the chamber B. The refuse matter thus partially consumed in the tank D, is further consumed in the incinerating chamber which receives its heat from the adjacent furnace, and the unconsumed particles are conducted through a second furnace where complete combustion is accomplished. This combustion of the unconsumed particles of refuse matter may be further increased by opening the damper *l* and leading the products of combustion from the chamber B, or part of them, through the flues Q^2 to the ash pit of the chamber H, so that they will pass directly through the burning fuel on the grate *h*. As the draft which supplies the fuel on the grate G^2 is conveyed by the flues J, J which lead from the hopper D, the noxious vapors, gases and odors present in the hopper D are drawn with the draft and fed to the fire on the grate G^2 so that they become completely destroyed. The escape of these noxious vapors and odors into the air is thus prevented. By employing the long intake draft flues J, J leading to the hopper D from the outlets *j* in the rear of the furnace remote from the hopper, drafts of comparatively cold air are introduced into the hopper, which, meeting the hot vapors, steam and gases arising from the refuse, partially condense them before they pass to the grate G^2. By the proper adjustment of the dampers at the inlets *j* the amount of air admitted may be regulated. There is also no liability of the escape of vapors and odors into the atmosphere from backing up in the intake flues. As has been heretofore explained any animal or vegetable oils that may be present in these vapors drawn from the hopper D through the pipes or flues J may be condensed by the condensers K and carried off through the pipes L. Such oil may thus be reclaimed for commercial use. I employ the second hopper E to drain off the water and liquors from wet refuse matter, so that the matter subjected directly to the heat and passing into the incinerator B is comparatively dry. Wet matter introduced into the hopper D is thrown into the tank E^2 and the perforated bottom e^2 acts as a drain to separate the water from the solid matter. The liquid drained from the matter passes off through the outlet E′ to the sewer and the dry matter is thrown into the body of the hopper over the trap D^2 by raising the tank E^2 through the lever or handle *e*. If desired instead of a tank or box E^2 a perforated door or screen may be employed.

The door F need be opened only for the purpose of introducing the refuse. With the various auxiliary flues shown the combustion in the furnace may be controlled as may be desired. Thus fresh air may be introduced above the fire on the grate G^2 through the flues N′ N′ and O and through the latter a blast of steam may be blown thus producing a strong blast through the furnace. Air may be introduced to the incinerator B through the flue P. The ashes from the incinerator B may by opening the door *c* be allowed to fall into the pit C whence they may be removed. By means of the water pipe E^3 the hopper E may be flushed and thus kept free from particles of refuse.

While I prefer such minor details of construction as have been shown I do not limit myself to them as they may be varied without making any departure from the invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace for burning refuse matter, the combination of an incinerating chamber, a fuel furnace communicating therewith, a closed hopper or reservoir communicating with the incinerating chamber, and adapted to receive the products of combustion therefrom and partially consume the refuse, an extended intake draft flue leading to the closed hopper from a remote point, and a second flue leading from the hopper to a point below the grate of the fuel furnace, whereby the hot vapors, steam and gases arising in the hopper are met by an incoming draft of comparatively cold air through the intake flue to the hopper and are more or less condensed thereby and are introduced to the fuel furnace below the grate therein.

2. In a furnace for burning refuse matter, the combination of a fuel furnace, an incinerating chamber communicating with the fuel furnace and receiving the products of combustion therefrom, the incinerating chamber being provided with an independent air flue P for supplying external air directly to the incinerating chamber, a damper for the air flue P to control the supply of air to the incinerating chamber; a second fuel chamber communicating with the incinerating chamber, and an external hopper of large size located above the incinerating chamber and having a communicating passageway therewith through which it is adapted to receive the products of combustion and thereby partially consume the refuse matter before the same is introduced into the incinerating chamber.

3. In a furnace for burning refuse matter, the combination of an incinerating chamber, a fuel furnace communicating therewith and supplying heat to the incinerating chamber, a

second fuel furnace connected with the incinerating chamber and receiving the products of combustion therefrom, a hopper or reservoir connected with the incinerating chamber, a draft flue leading from the hopper to the first furnace, and a long intake flue leading from a distance to the hopper for supplying comparatively cold air thereto and regulating the quantity thereof by the adjustment of the inlet to said flue.

4. In a furnace for burning refuse matter, the combination of an incinerating chamber, a fuel furnace communicating therewith and supplying heat to the incinerating chamber, a second fuel furnace connected with the incinerating chamber and receiving the products of combustion therefrom, a hopper or reservoir connected with the incinerating chamber, and adapted to receive products of combustion therefrom and partially consume the refuse before it is introduced into the incinerating chamber, a draft flue leading from the hopper to the first furnace and independent draft flues leading to the second furnace for supplying external air directly thereto.

5. In a furnace for burning refuse matter, the combination of a fuel furnace, an incinerating chamber communicating therewith and receiving the products of combustion therefrom having an independent air flue P for supplying external air directly to it, and a second fuel furnace communicating with the incinerating chamber, having an independent air flue Q for supplying external air directly to it and a large closed receiving and incinerating hopper located above the incinerating chamber and communicating therewith through a passage, whereby the refuse may be partially consumed in the hopper before it is introduced into the first incinerating chamber.

6. In a furnace for burning refuse matter, the combination of an incinerating chamber, a fire box communicating therewith through a flue, a fuel grate in said fire box, a hopper or reservoir for supplying material to the incinerating chamber, a draft flue leading from the hopper to the fire box below the grate, independent draft flues leading to the fire box above the grate, and a blast pipe entering the fuel furnace above the grate.

7. In a furnace for burning refuse matter, the combination with a suitable incinerating chamber, of a receiving hopper communicating with the incinerating chamber and having an independent liquid outlet provided with a movable perforated draining frame or box adapted to receive the refuse matter and drain the liquids from the solids thereof.

8. In a furnace for burning refuse matter, the combination with an incinerating chamber of a closed supply hopper communicating therewith, a fuel furnace communicating with the incinerating chamber and supplying heat thereto, and a draft flue leading from the hopper to the fuel furnace below the grate thereof and a condenser about the flue to condense and reclaim the coils &c. contained in the vapors conducted from the hopper by the flue.

9. In a furnace for burning refuse matter, the combination with an incinerating chamber of a closed supply hopper communicating therewith, a fuel furnace communicating with the incinerating chamber and supplying heat thereto, a draft flue leading from the hopper to the fuel furnace below the grate thereof, and a condenser about the flue, and a pipe leading from said draft flue below the condenser to convey the condensed oils &c. therefrom.

10. In a furnace for burning refuse matter, the combination of an incinerating chamber, a supply hopper communicating therewith, a furnace communicating with the incinerating chamber and supplying heat thereto, a draft flue leading from the supply hopper to the furnace below the grate, and a steam blast pipe opening into said furnace above the grate.

11. In a furnace for burning refuse matter, the combination of an incinerating chamber, a supply hopper communicating therewith, a furnace communicating with the incinerating chamber and supplying heat thereto, a draft flue leading from the supply hopper to the furnace below the grate flues N′, N′ leading to the furnace above the grate, and a steam blast pipe opening into said furnace through the flues N′ N′.

12. In a furnace for burning refuse matter, the combination of a fuel furnace G, an incinerating chamber B communicating with the fuel furnace through a flue G′, a hopper D to receive refuse matter and supply it to the incinerating chamber receiving the products of combustion directly from the incinerating chamber, whereby the refuse matter is partially consumed before it enters the incinerating chamber, a second fuel chamber H having communication with the incinerating chamber both above and below its fuel grate, a draft flue leading from the receiving and consuming hopper to the fuel chamber G below the grate thereof, and a long flue leading from the lower portion of the furnace to the hopper for supplying air to the hopper, and regulating the quantity thereof and also for preventing the escape of noxious odors into the atmosphere.

In testimony of which invention I have hereunto set my hand.

TERRENCE P. MAHON.

Witnesses:

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H. L. MOTHERWELL.