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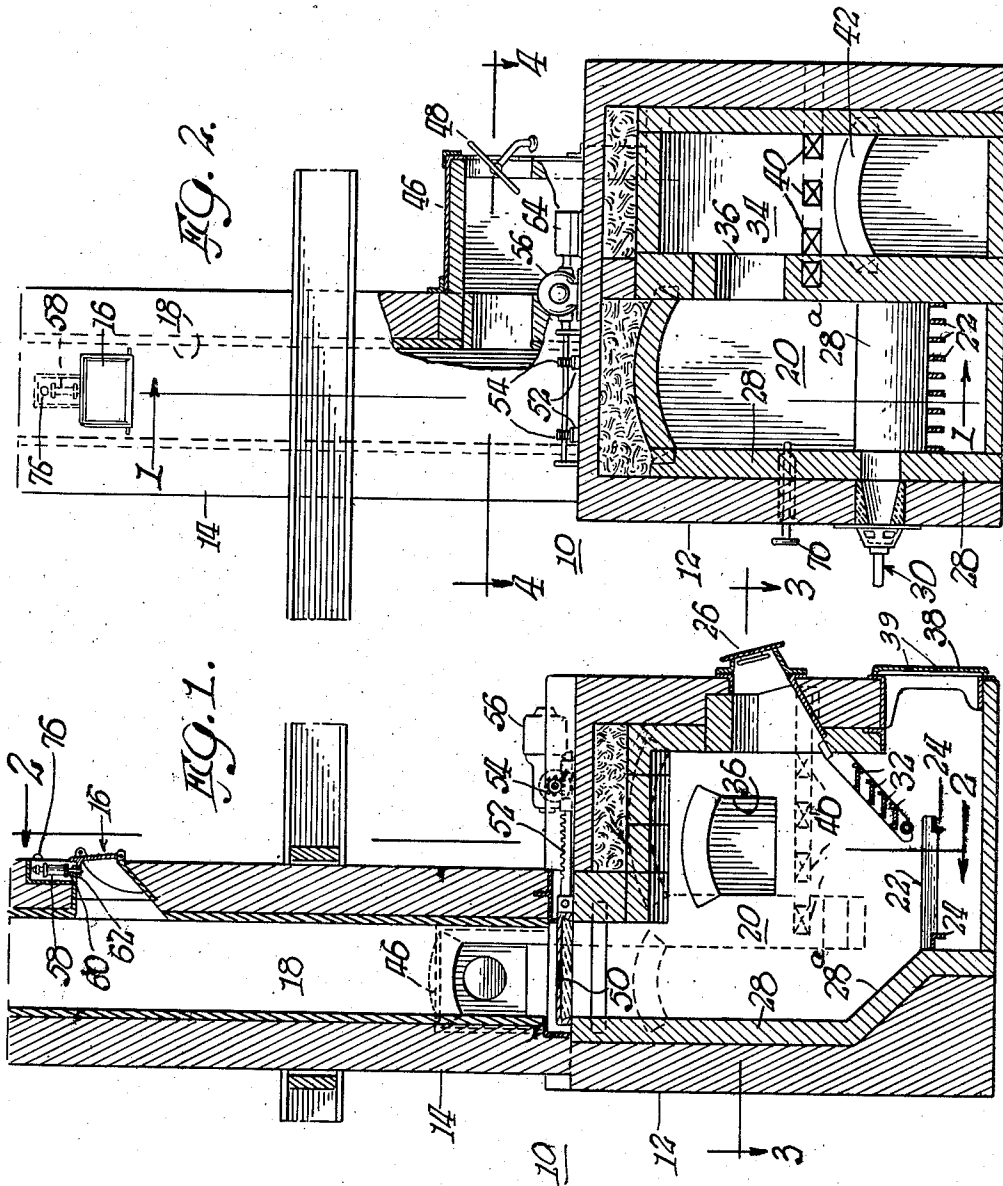
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2,838,016

INCINERATOR CONSTRUCTION

Filed June 30, 1955

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

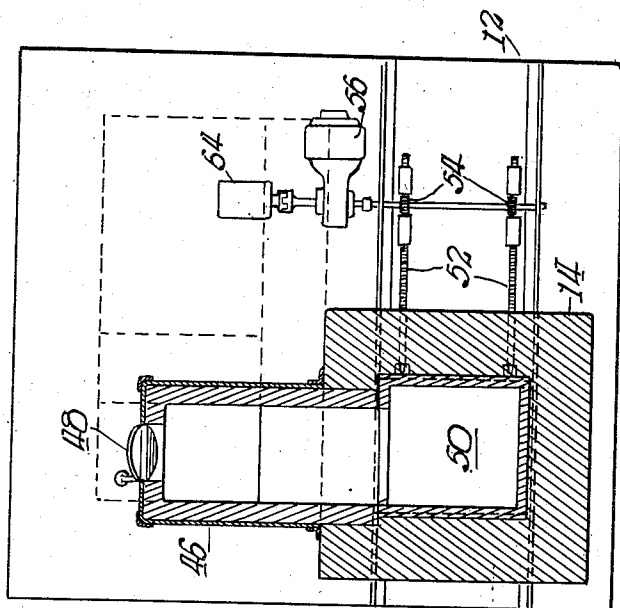


FIG. 4.

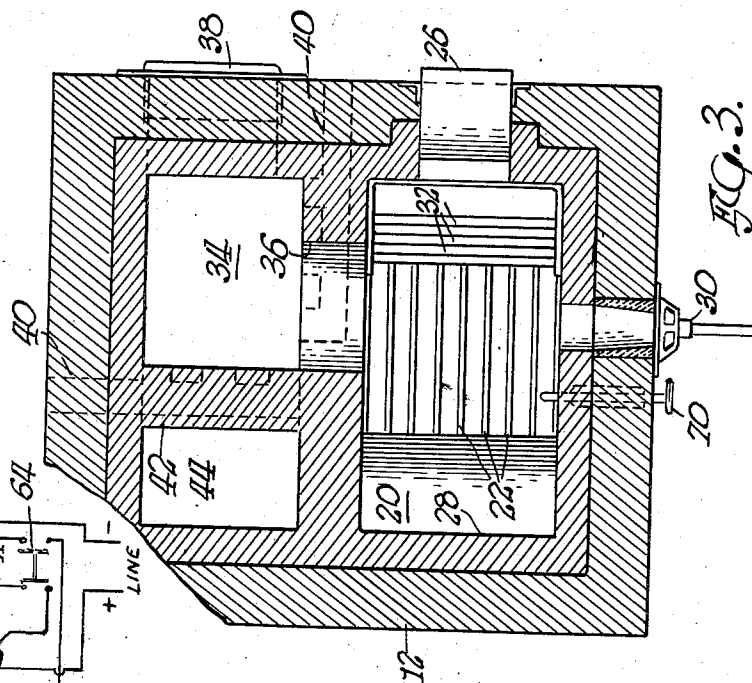


FIG. 3.

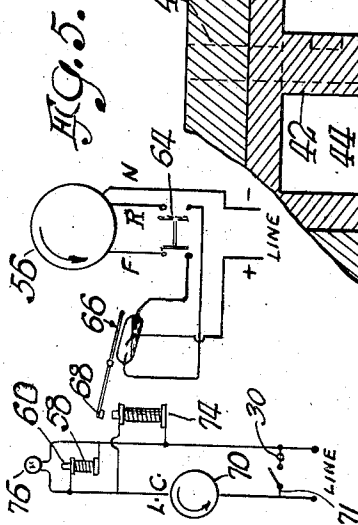


FIG. 5.

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INCINERATOR CONSTRUCTION

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4 Claims. (Cl. 110—18)

The present invention relates to an improved incinerator construction, and, more particularly, pertains to a chimney-fed incinerator in which the charging of garbage and other waste therein is carried out only when gases of combustion are absent from the chimney passageway.

In prior art chimney-fed incinerator constructions, the person depositing the material to be disposed of is often subjected to exposure to gases of combustion rising from the underlying burning chamber. This exposure takes place if the charging is carried out during the course of incinerator operation, and not only discomforts the person depositing the material to be incinerated, but, in addition, the rising gases also contaminate the surrounding area.

It is an object, therefore, of this invention to provide a chimney-fed incinerator construction in which charging of garbage or other material to be incinerated may only take place when the incinerator is not in operation and gases of combustion are not present in the chimney passageway.

It is another object of this invention to provide a chimney-fed incinerator construction utilizing charging doors having remotely controllable locks whereby the charging doors may be opened only when the incinerator is not in operation.

It is a further object of this invention to provide an incinerator construction utilizing charging doors having locks which are automatically actuated, thereby eliminating the need of a human agency.

It is a still further object of this invention to provide a chimney-fed incinerator construction in which the time during which the incinerator is in operation is visibly made known to the users thereof.

It is a still further object of this invention to provide a chimney-fed incinerator construction in which the gases of combustion must follow a predetermined course through a secondary combustion chamber and a settling chamber, whereby complete combustion is assured and any entrained ash or other matter is allowed to settle prior to the emergence of the gases to the atmosphere.

It is another object of this invention to provide a chimney-fed incinerator construction in which the charging doors are automatically locked upon the attaining of a minimum temperature in the burning chamber.

Further and additional objects will appear from the description, accompanying drawings and appended claims.

In one embodiment of this invention, an incinerator utilizing a burning chamber is provided having a chimney surmounted over the chamber and in direct communication therewith. The incinerator is adapted to serve either a one or a multistoried structure, and the chimney has at least one waste-charging door for each story served. A combustion chamber is in juxtaposition with the burning chamber and insures complete burning of the waste material prior to discharge of the gases of combustion to the atmosphere. A reciprocally movable, preferably motor-operated, damper is interposed between the burning chamber and the chimney passageway and effects a

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seal between the latter two incinerator portions during the normal course of incineration. The gases of combustion are thus forced to travel from the burning chamber and through the combustion chamber; a breeching connection joins the combustion chamber and the chimney passageway whereby the gases may discharge to the atmosphere after having followed a predetermined circuitous path. The motor operating the damper actuates a cam which trips a limit switch stopping the motor and damper movement when the latter damper is in place in the closed position. The locking solenoids are electrically actuated by a high temperature limit control element which allows current to reach the solenoids and which is positioned in the burning chamber. Upon energizing the locking solenoids, by means of the control element, an auxiliary solenoid is energized which, in turn, energizes the motor for the reciprocally movable damper closing the same.

For a more complete understanding of the invention, reference should now be had to the drawings, wherein—

Figure 1 is a longitudinal sectional view of one embodiment of the incinerator construction provided;

Fig. 2 is a longitudinal sectional view, partly in elevation, taken on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary transverse sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a transverse sectional view, partly in elevation, taken on line 4—4 of Fig. 2; and

Fig. 5 is a wiring diagram of the electrical circuits employed in the illustrated apparatus.

General incinerator construction

Referring now, more particularly, to Fig. 1, one embodiment of this invention is illustrated comprising an incinerator 10 having a lower furnace portion 12 which has surmounted thereover and in direct communication therewith a chimney 14. The incinerator illustrated is adapted to serve a multistoried structure, and the chimney is, therefore, provided with at least one charging door 16 for each story served, whereby garbage or other waste to be incinerated and disposed of is inserted through the charging door, allowed to drop down through a chimney passage 18 and into a burning chamber 20 of the furnace.

It will be noted from Fig. 1 that the material to be incinerated accumulates on grate member 22 disposed across the bottom of the burning chamber 20 and supported by the channel members 24 which may be embedded in the opposed walls of the burning chamber or supported by other suitable means. It will also be noted from Fig. 1 that waste material or garbage may be directly charged into the burning chamber 20 by means of the charging door 26 positioned in a wall of the furnace portion 12. The furnace 12 is suitably lined with a refractory material 28, such as firebrick.

Referring now to Figs. 2 and 3, it will be noted that an automatic burner 30, which may be adapted to burn either gas or oil, is normally disposed to the central portion of the burning chamber 20 and is adapted to readily incinerate the waste material positioned on the grate member 22.

It will also be noted from Fig. 1 that a plurality of transverse channel members 32 are arranged in stepped relationship across the lower portion of the burning chamber 20 and may be embedded in opposed wall members of the furnace in a manner similar to the channel members 24. It is obvious that the stepped alignment of the channel members 32 and the directly opposed furnace wall portion 28a enable the waste or garbage deposited through the charging doors in the chimney 14 to be centrally positioned in the portion of the burning chamber 20 in direct alignment with the incinerating flames emanating from the burner member

30. It is obvious that, although one burner member is illustrated, a plurality may be utilized to conform with the size of the burning chamber 20.

Combustion chamber

Referring now to Fig. 3, it will be seen that the furnace portion 12 of the incinerator 10 is composed of a plurality of chambers in juxtaposition with the burning chamber 20. A combustion chamber 34 is in communication with the burning chamber by means of a flame port 36. It is obvious from Fig. 3 that the flames from the burner 30 may project across the width of the burning chamber 20, through the flame port 36 and into the combustion chamber 34. Positioned in the lower portion of the combustion chamber is a clean-out door 38 which is adapted to facilitate removal of the ash and other end products of combustion which accumulate on the combustion chamber floor. The ash removal door 38 is louvered or otherwise suitably apertured as indicated by the numeral 39, to allow the admittance of air into the combustion chamber 34. Smoke, odors, and entrained particles from gases emerging from the burning chamber 20 are completely burned in the combustion chamber 34. It is thus seen that the furnace 12 actually comprises a burning chamber and a combustion chamber in series, and assures complete combustion of the waste material whereby the gases emerging through the chimney 14 are free from entrained particles and odors. Additional air may also enter the combustion chamber 34 by means of air ducts 40. The ducts 40 in combination with the apertured, ash removal door 38 assure sufficient oxygen in the furnace chambers at all times.

The remaining gases of combustion in combustion chamber 34 emerge therefrom by passing under a curtain wall 42, shown in Figs. 2 and 3 into the uppass 44, more clearly shown in Fig. 3, and thence into the breeching connection 46, shown in Fig. 2, which is in direct communication with the chimney passage 18.

Flow of gases of combustion

It is thus seen that in the normal course of incineration, garbage or waste material accumulated on grate 22 in burning chamber 20 is exposed to the flames of the burner 30. The gases of combustion containing some entrained particles and fly ash pass through flame port 36, into the combustion chamber 34, where complete combustion is assured by the admittance of large amounts of oxygen, through the air ducts 40 and the ash removal door 38. Any entrained ash in the gases will also settle on the floor of the chamber 34 from which it may readily be removed by means of the ash removal door 38. The gases in the combustion chamber 34 then pass through the uppass 44 which is in communication with the breeching connection 46 which, in turn, communicates with the chimney passageway 18. It will be noted from Fig. 2 that a barometric damper 48 is provided in a wall of the breeching connection 46 which is regulated by the velocity of gases passing through and aids in the maintenance of a constant desired velocity of the gases of combustion flowing into the chimney passage 18.

Damper member

To insure the indirect passage of the gases from the burning chamber, through the combustion chamber, into the uppass and thence out the chimney passage 18, a reciprocally movable damper 50, clearly shown in Figs. 1 and 4, is provided. The damper 50 is affixed to two rack members 52 which engage pinion members 54. The latter members are driven by a motor 56 which comprises the motive means for the reciprocal movement of the damper 50. When in the position shown in Fig. 1, the damper 50 prevents the discharge of the gases of combustion into the chimney passage 18 from the burning chamber 20. The gases are then caused to follow

the predetermined and previously described path detailed above.

Charging doors, locking means, and electrical circuits therefor

As has been above mentioned, it is intended that this invention provide means whereby the gases of combustion are forced to travel a predetermined circuitous path. This means comprises the above-mentioned damper member and the various chambers of the incinerator, also described in detail above. It is also the intention of this invention to provide means whereby the charging doors in the chimney 14 are in the locked position during the normal course of incineration. Thus, the damper member 50 will be in the closed position illustrated in the various figures of the drawings, and the charging doors 16 will be locked as illustrated in Fig. 1 when incineration is taking place in the provided incinerator construction.

The system whereby the damper member 50 is in the closed position illustrated in the drawing, and whereby the charging doors 16 are locked during the normal course of incineration will become apparent from an inspection of Fig. 5, the latter figure comprising an electrical circuit.

Disposed in the burning chamber 20 of the incinerator 10 is a high temperature limit control 70. This control, in addition to being illustrated in the wiring diagram of Fig. 5, is also depicted in Fig. 2. It is the function of this latter limit control to allow current to flow to a locking solenoid 58 during incineration, whereby a plunger member 60 of the latter solenoid may depend into a charging door lug 62, thereby preventing the door 16 from being opened. The limit control 70 will enable current to reach the solenoid 58 only if a predetermined temperature is reached in the burning chamber 20.

It will be further noted from Fig. 5 that, simultaneously with the energizing of the locking solenoid 58, pilot light 76 which is also illustrated in Fig. 1, will receive current and glow, informing any onlooker in the vicinity of the charging door that incineration is taking place and that the charging door 16 is, therefore, locked. The limit control 70, upon the attaining of a predetermined temperature in the burning chamber 20 concomitantly allows current to flow to and energize an auxiliary solenoid 74, seen in Fig. 5. This latter solenoid will attract a pivotally mounted contact arm 68 to which a double throw mercury switch 66 is secured. It is apparent, therefore, that the double throw switch 66 is pivotally movable and upon the arm 68 being magnetically attracted by means of the auxiliary solenoid 74 will pivotally move from the position illustrated in Fig. 5.

When the arm 68 and switch 66 are in this latter position, the motor 56 for the damper 50 is forced to maintain the damper in the withdrawn or retracted position; that is, the motor is energized so as to withdraw the damper 50 from between the chimney passage 18 and the burning chamber 20. After the damper motor 56 has completely withdrawn the damper from the chimney passage, a limit switch 64, which is cam-operated by the damper movement, is actuated, thereby stopping the motor.

However, when the auxiliary solenoid 74 is energized, the double throw switch contact arm 68 is attracted, forcing the switch 66 to pivotally move and simultaneously rearrange the mercury within the switch so as to now energize the damper motor 56, causing the same to move the damper into a position illustrated in the drawings. It is thus seen that the disposition of the damper member 50 is controlled by the damper motor 56 which is, in turn, controlled by the double throw switch 66. The angular disposition of the latter switch is controlled by auxiliary solenoid 74 which is energized or de-energized, depending upon the temperature in the burning chamber 20. It is thus seen that when the temperature in the

burning chamber 20 rises above a predetermined set temperature for which the high temperature limit control is set, the auxiliary solenoid 74 is energized. Energization of the auxiliary solenoid forces the damper to move into the position illustrated in the drawings. Although a single solenoid 58 is illustrated in Fig. 5, it is intended of course, that this invention cover incinerator constructions in which several locking solenoids similar to 58 may be connected in parallel and operatively associated with their respective charging doors.

The high temperature in the burning chamber 20 may result either from manually setting fire to the material in the burning chamber by means of a match or the like, or by throwing the switch 71, illustrated in Fig. 5, which starts the burner 30.

Following the incineration process, the limit control 70 will break the circuit, following a decrease in temperature in the burning chamber, de-energizing the locking and auxiliary solenoids as well as stopping current to the pilot light 76. The double throw mercury switch 66 will then be enabled to assume the position illustrated; that is, the position assumed when its contact arm 68 is not attracted by the solenoid 74. In this position the previously tripped limit switch 64 will enable the damper motor 56 to be immediately energized, thereby causing the damper 50 to retract from between the burning chamber and the chimney passage whereby garbage or other material to be incinerated may be deposited in the chimney passage 18 through the now operable charging door 16 enabling the same to drop directly into the burning chamber.

It is thus seen that a novel incinerator construction has been provided in which the gases of combustion are forced to travel a predetermined course during the incineration process assuring complete combustion of the waste or garbage and the exhaustion of clean gases into the atmosphere. In addition, the provided incinerator enables the charging doors to be simultaneously locked upon the attaining of a predetermined temperature in the burning chamber with the movement of a damper member into the chimney passage which forces the gases of combustion to travel the predetermined, desired path.

Although a single embodiment of this invention has been illustrated, it is apparent that many modifications may be made in details of construction without departing from the inventive concept contained herein. The provided invention, therefore, is to be limited only by the scope of the appended claims.

I claim:

1. An incinerator construction comprising a burning chamber, a combustion chamber in juxtaposition with said burning chamber and in communication therewith, chimney means surmounted over said burning chamber and in communication therewith, a breeching connection in communication with said combustion chamber and said chimney means, refuse charging means positioned in said chimney means enabling material to be incinerated to be dropped through said chimney means and accumulated in said burning chamber, locking means affixed to said chimney means for maintaining said refuse charging means in openable or locked conditions, reciprocally movable damper means positioned in said chimney means for sealing said burning chamber from said chimney means in the normal course of incineration, control means for said locking means comprising temperature sensitive means disposed in said burning chamber, said damper means being rendered effective by said temperature sensitive control means by assuming the sealing position between the said burning chamber and said chimney means when said burning chamber reaches normal operating temperature.

2. An incinerator construction comprising a burning chamber, burner means positioned in said burning chamber, a combustion chamber in juxtaposition with said burn-

ing chamber and in communication therewith, chimney means surmounted over said burning chamber and in communication therewith, a breeching connection in communication with said combustion chamber and said chimney means, refuse charging means positioned in said chimney means enabling material to be incinerated to be dropped through said chimney means and accumulated in said burning chamber, locking means for said refuse charging means maintaining said charging means in openable or locked conditions, reciprocally movable damper means positioned in said chimney means for sealing said burning chamber from said chimney means in the normal course of incineration, control means for said locking means and damper means comprising temperature sensitive means disposed in said burning chamber, said control means forcing said damper means to assume the sealing position between the burning chamber and the chimney means, and forcing said locking means of said charging means to be rendered effective whereby said charging means are maintained in the locked condition when the burning chamber reaches normal operating temperature.

3. An incinerator construction comprising a burning chamber, means forming a passage in communication with said burning chamber for conducting gases of combustion from said burning chamber to the atmosphere surrounding said incinerator, said passage forming means having at least one refuse-charging opening disposed therein, means forming a closure for each of said charging openings, remotely controllable means for maintaining each of said charging opening closures in openable or locked conditions, means disposed in said burning chamber for rendering said remotely controllable means effective when the temperature in said burning chamber is the normal operating temperature whereby said charging opening closures are maintained in the locked condition, said remotely controllable means becoming de-energized whereby said refuse-charging opening closures are rendered openable when the temperature in said burning chamber drops below the normal operating temperature.

4. An incinerator construction comprising a burning chamber, burner means disposed in said burning chamber, manually operable energizing means for said burner means disposed exteriorly of said incinerator, direct passage means connecting the burning chamber with the atmosphere, indirect passage means connecting the burning chamber with the atmosphere, means comprising a damper movable between positions closing communication between said direct passage means and the burning chamber and establishing communication therebetween, said direct passage means having a refuse-charging opening formed therein, means forming a closure for said refuse-charging opening, means for maintaining said closure means in openable or locked conditions, temperature sensitive control means disposed in said burning chamber for energizing said locking means thereby forcing said closure means into the locked condition and rendering the damper means effective whereby the same assumes the communication closing position when said burning chamber reaches normal operating temperature.

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