June 6, 1939. R. G. GREGG ET AL 2,161,412

INCINERATOR

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Fig. 1

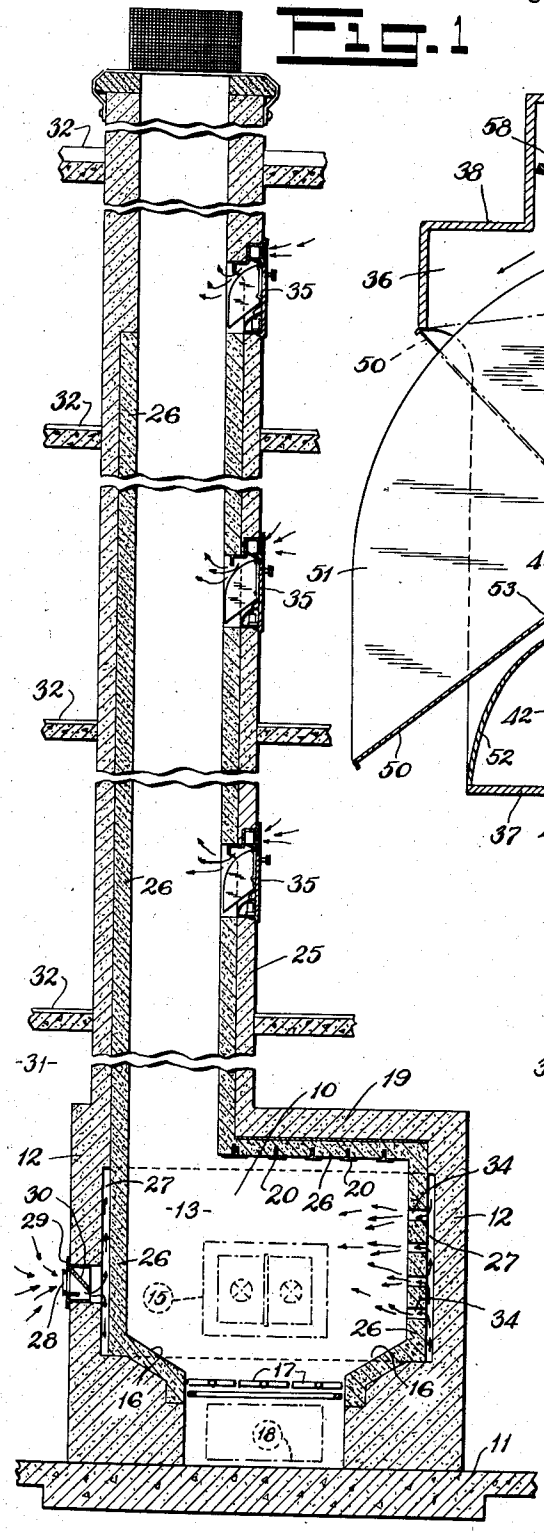


Fig. 2

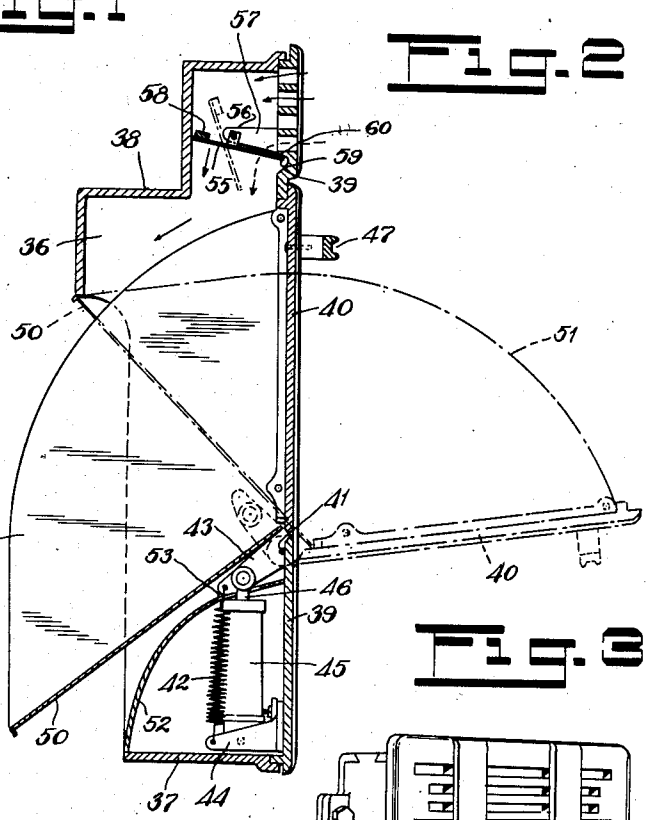
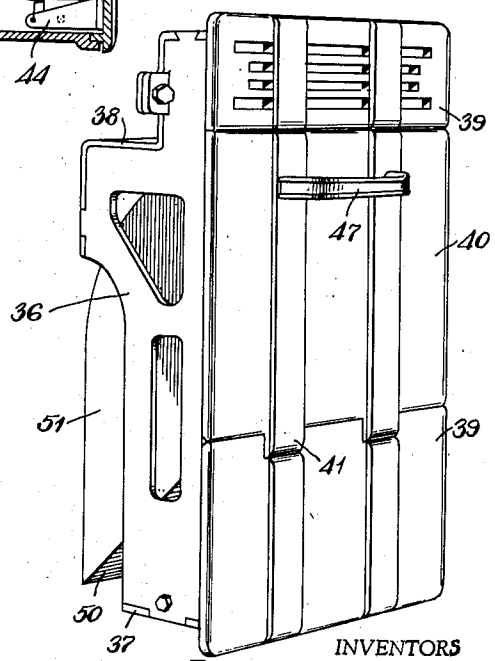


Fig. 3



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INCINERATOR

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2 Claims. (Cl. 110—18)

This invention relates to improvements in flue-fed incinerators adapted for use in the reduction, in situ, of comparatively bulky combustible waste material, including garbage and the like, from multi-story hotels, apartment houses and office buildings.

In most flue-fed incinerators there exists the serious fault of excessive draft. This excessive draft is occasioned because commercial practice in the construction of incinerators of the class described is to make the cross-sectional area of the flue at least three times the area of the hopper doors or package chutes through which material is deposited or fed into the flue from any one of the many floors of the building. Measured purely in terms of the amount of draft necessary to the complete combustion of material deposited in the incinerator the cross-sectional area of the flue is excessive and made so as a precaution against the clogging in the flue of boxes, packages, crates, etc., as they break up, spread out or tend to fall crosswise on their way downwardly to an incinerator chamber at the base of the flue. Finally, this excessive draft causes burning or burned material, known as fly-ash, to be blown out of the top of the flue when material is being burned in the incinerator.

An important object of our invention is to reduce the excessive draft necessarily present in an incinerator of the class described by means of a plurality of normally closed automatically operable valve means disposed in the flue of the incinerator, preferably by placing one such valve means on each floor of the building proximate the hopper door through which material is deposited into said incinerator, so that fly-ash will not be blown out of the top thereof.

A further object of the invention is to aid the combustion within the incinerator flue of papers and the like which having become ignited in the combustion chamber may thereafter be drawn into the flue.

Another object of our invention is to so locate the valve means above described that the same may be used as a ventilator for any room, hall, closet or the like from which air entering the flue may be drawn.

Other objects and advantages of our improved incinerator will become apparent from, or be specifically referred to in, the following description thereof written in connection with the accompanying drawing, in which:

Figure 1 shows a cross-sectional view taken in a plane passing vertically through the flue and combustion chamber of a preferred form of incinerator embodying our invention; and illustrates the placement in the flue of a hopper door, package chute and ventilator corresponding to each of the several floors of a building in which the same is constructed.

Figure 2 is an enlarged cross-sectional view of a hopper door and package chute and a preferred form of means for mounting the same proximate a ventilator or draft reducing valve like that shown in Figure 1.

Figure 3 is a perspective view of the hopper door and ventilator mounting with the door in closed position.

Referring now to Figure 1, it will be seen that the incinerator here shown comprises a combustion or incinerating chamber **10** of any suitable size and formation preferably constructed of brick or other suitable material upon a foundation **11**, forming a part of the basement floor of a building. The combustion chamber **10** is formed by side walls **12—12**, a back wall **13**, a front wall **14** (not shown) in which is mounted a fire door **15** shown in dotted lines. The walls of the chamber **10** preferably slope as at **16** toward a dumping grate **17** disposed above any suitable ash-pit to which access is afforded through an ash door **18** indicated in dotted lines below the grate **17** as being carried by the front wall. The chamber **10** is covered by a roof **19** preferably supported by suitable structural steel shapes **20**. The roof **19** in the embodiment of the invention here shown serves with one of the side walls as a support for the flue **25**, and as a baffle for directing downwardly flames from material being burned in the chamber to facilitate such burning.

The inside surface of the chamber **10**, and the flue **25** for a distance of from 25 to 30 feet above the roof of the chamber, is lined with any suitable refractory material **26** such as fire brick and the like. An air chamber **27** is formed about the combustion chamber **10** between the fire brick lining **26** thereof and the walls **12**, **13** and **14**. At one side of the chamber **26** an opening **28** to atmosphere is provided by means of air inlet fixture **29** mounted in the side wall of the chamber and provided with an automatic valve **30** through which air sufficient to support the combustion of material deposited in the chamber is adapted to enter chamber **10**, after passing around the same through an air chamber **27**, through openings **34** in the lining **26** at the side thereof remote from the inlet **28**.

It is usual, as here illustrated, to build the combustion chamber of the incinerator in the basement **31** of the building to be served thereby,

whereupon flue 25 extends upwardly therefrom through the several floors 32 of the building and up through the roof thereof, not shown. The top of the flue is covered by any suitable screen 33 to catch and prevent the exit therefrom of fly-ash. It will be understood that while there is no need for such a screen on the flue of an incinerator embodying our invention, for reasons to be hereinafter explained, that the same is here shown merely because it is, at the present time, required by the authorities having to do with the inspection and installation of devices of the class described.

At a convenient distance above each floor 32, of the building in which is installed an incinerator embodying our invention a hopper door and ventilator mounting means 35 is installed in the flue 25 as shown in Figure 1. Referring now to Figures 2 and 3 it will be seen that the mounting means 35, here shown by way of illustration, comprises a pair of side pieces 36 of any suitable construction having the ends of a bottom piece 37 secured to the lower ends of the side pieces 36 and the ends of an angular top piece 38 secured to the upper ends of the side pieces 36. The pieces 36, 37 and 38, when assembled, form what for the want of a better name may be described as a supporting frame for a front 39 having a hopper door 40 hinged thereto at 41 and adapted to close an opening therein through which waste is deposited in the flue 25. A spring 42 having one end secured to an arm 43 formed on the inside of the door 40 and the other end secured to an arm 44 on the inside of the front 39 near the bottom thereof is adapted to yieldably urge the door 40 to the closed position. A dash-pot or door check 45 pivoted on the arm 44 and having a plunger 46 pivoted on the arm 43 serves to prevent the door from slamming against the frame 39 when the same is permitted to be closed under the influence of the spring. A handle 47 is provided on the door 40 whereby the same may be opened to the position indicated by dotted lines in Figure 2.

A package chute 50, comprising a sheet of material secured to and inclined inwardly and downwardly from the lower edge of the door 40 and having sides 51 secured respectively to both the side edges of the chute and the inside edges of the door is constructed to prevent, when the door is open as shown in dotted lines, the deposition into the flue of packages larger than that which will fit between the surface 50 and inside surface of the door, and close the flue while material is being disposed in the chute preliminary to being charged into said flue. A shield 52 having a hole 53 through which the plunger 46 freely passes is secured in any suitable way to the bottom 37 to afford protection against heat or the collection of ashes, etc., about the door check or dash-pot 45.

The upper portion of the front 39 is formed to serve as a ventilator through which air is admitted as indicated by the arrows past an automatically operable damper or draft valve 55. The damper or valve plate 55 is pivotally mounted in any suitable way, as at 56, to rock on a pair of arms 57, only one of which is shown, secured on the inside to the side edges of the front 39, and adapted under normal conditions to prevent the passage of air from the inside of the flue out through the ventilator in a direction opposite to that indicated by the arrows. A weight 58 is secured to one edge of the valve 55 so that the opposite edge 59 thereof is normally urged to come to rest against a stop 60 as shown in Figure 2. It will be further observed that the pivot 56 by which the valve 55 is rockably mounted, as above described, is disposed nearer to the weight 58 than to its opposite edge 59 with the result that a somewhat greater damper area will be presented to the outside air having a tendency to open the valve and enter the flue. Normally when the incinerator is not in use the weight 58 is sufficient to close the damper 55 against the stop 60. When, however, a draft is created within the flue, the damper 55 will automatically assume some such position as that shown in dotted lines in Figure 2. The point 56, at which the damper 55 is rockably mounted to the arm 57 is spaced from the inward end of said arm sufficiently to enable said end to engage the damper ing the position shown in dotted lines so as to limit the amount of its movement of rotation and insure the automatic closing thereof when there is insufficient draft in the flue to open the same.

We shall now describe the operation and further advantages of our invention.

The excessive draft heretofore referred to in devices of the character described exists since, as the term "flue-fed" implies, the flue is used not only as means for carrying off the products of combustion but also as a chute for feeding bulky waste and garbage material to the incinerator chamber at its base. From the foregoing description it will be understood that the size of the flue is far in excess of the normal chimney requirements for only carrying off the gases of combustion. Hence in the operation of our device, when material is burned in the combustion chamber 10 and an excessive draft produced in the flue, the dampers 55 on each floor will automatically open and admit air from the respective floors in an amount necessary to check the draft in the flue to a point such that the same will properly support the combustion of material in the incinerator chamber. When the burning of refuse in the chamber is at its height, so to speak, the amount of draft admitted through each ventilator will of course be at a maximum, and as the fire burns out the amount of ventilating or draft checking air will be proportionately reduced.

Other advantages in a device such as above described is that gases liberated during the burning of material in the chamber will be confined for a longer period within the hot zone of the incinerator and not escape up the flue; and the admission of air at different elevations along the flue has the effect of increasing the rate of burning of ignited material drawn into or suspended in the flue so that the same will be consumed before it can be carried out through the top thereof.

In view of the foregoing it will be understood that the problem presented by a desire to improve the operation of flue fed incinerators is one of reducing and controlling the draft. It is impossible to do this by the ordinary means of providing a single damper extending across the flue itself because if such were placed anywhere in the flue, except above the top hopper door, it would interfere with the packages loaded into the incinerator through the flue. If placed above the uppermost door, it would cause the smoke and gases to back up and be forced out the hopper doors into livable space.

With our invention, however, we are able to bring about this reduction and control of excessive draft in an over-sized flue by one or more

openings into the flue above the incinerating chamber in combination with a one-way automatic valve means to control the entrainment of air and to prevent back draft. The pressure of the outside air, being greater than the hot gases within the chimney, will cause this valve to open. As the extent of this opening will be in proportion to the pull of the chimney, secondary air in corresponding volume will enter, automatically reducing the draft to the point where greatly improved combustion will be obtained.

Through this reduction and control of draft all garbage and waste within the incinerator is thoroughly burned. Malodorous gases liberated during the burning process are confined within the hot zone of the incinerating chamber for a longer period, thus being consumed. Sparks and fly-ash will be reduced. The flames and heat are more closely confined to the incinerating chamber, thus decreasing the tendency toward cracking the chimney and the radiation of heat to the upper floors.

While we have described what now seems to be the preferred embodiment of our invention it is conceivable that various modifications in the configuration, composition and disposition of one or more of its component elements may occur to those skilled in the art, hence no limitation is intended by the phraseology of the foregoing description or illustrations in the accompanying drawing.

What is claimed is:

1. An incinerator comprising means forming an incinerating chamber, and flue means leading upwardly from said chamber through which combustible waste material, including garbage and the like, may be charged into and conducted by said flue to said chamber, in combination with a normally closed automatically operable check valve responsive to differences in atmospheric pressure on the inside and outside of said flue disposed at vertically spaced intervals therein, each said check valve being adapted to admit air into said flue when material is being burned in said chamber.

2. An incinerator for multiple story apartment buildings and the like comprising means disposed in the basement of a building and forming an incinerating chamber, and a flue extending upwardly from said chamber past a plurality of floors and through the roof of said building, said flue having means in the side thereof corresponding to and conveniently accessible from each floor through which comparatively bulky combustible waste material, including garbage and the like, may be charged into and conducted by said flue to said chamber, in combination with automatic means in said flue spaced from each floor of said building and adapted to admit air into said flue whenever the ambient atmospheric pressure is in excess of that in the flue.

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