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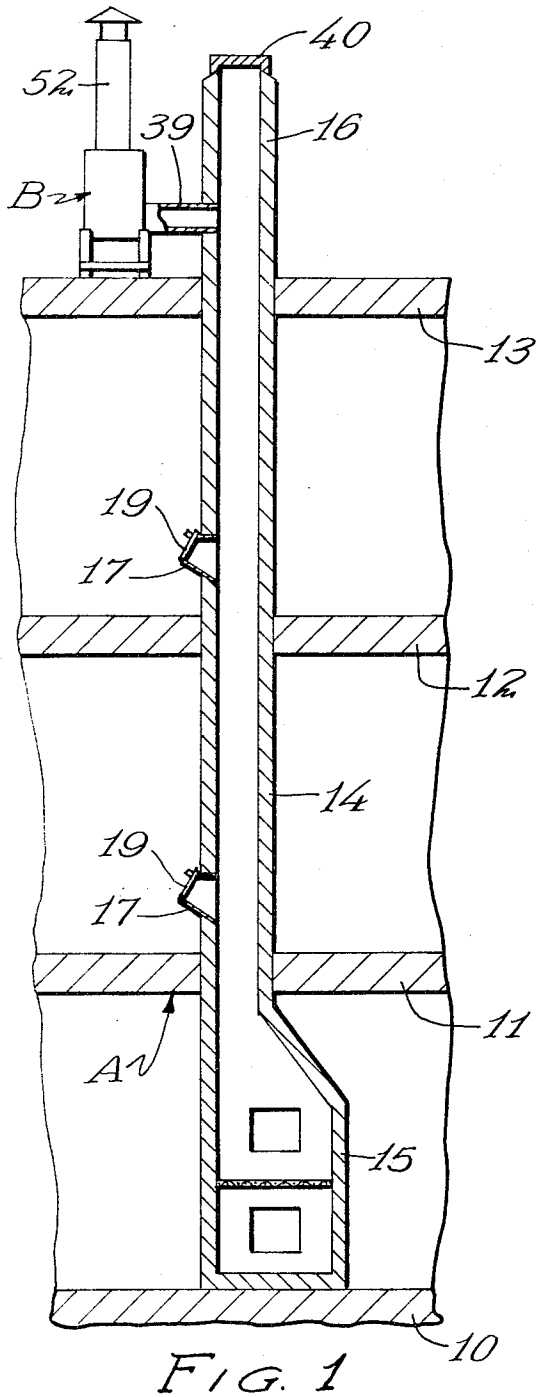
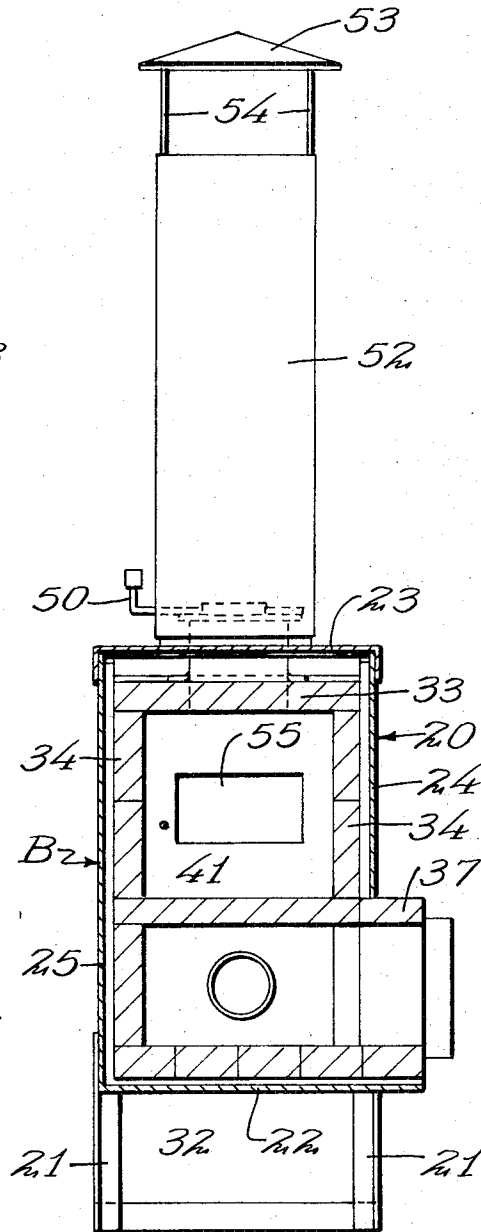
R. H. WIEKEN ET AL

3,832,144

SMOKE ELIMINATOR

Filed Sept. 21, 1972

2 Sheets-Sheet 1



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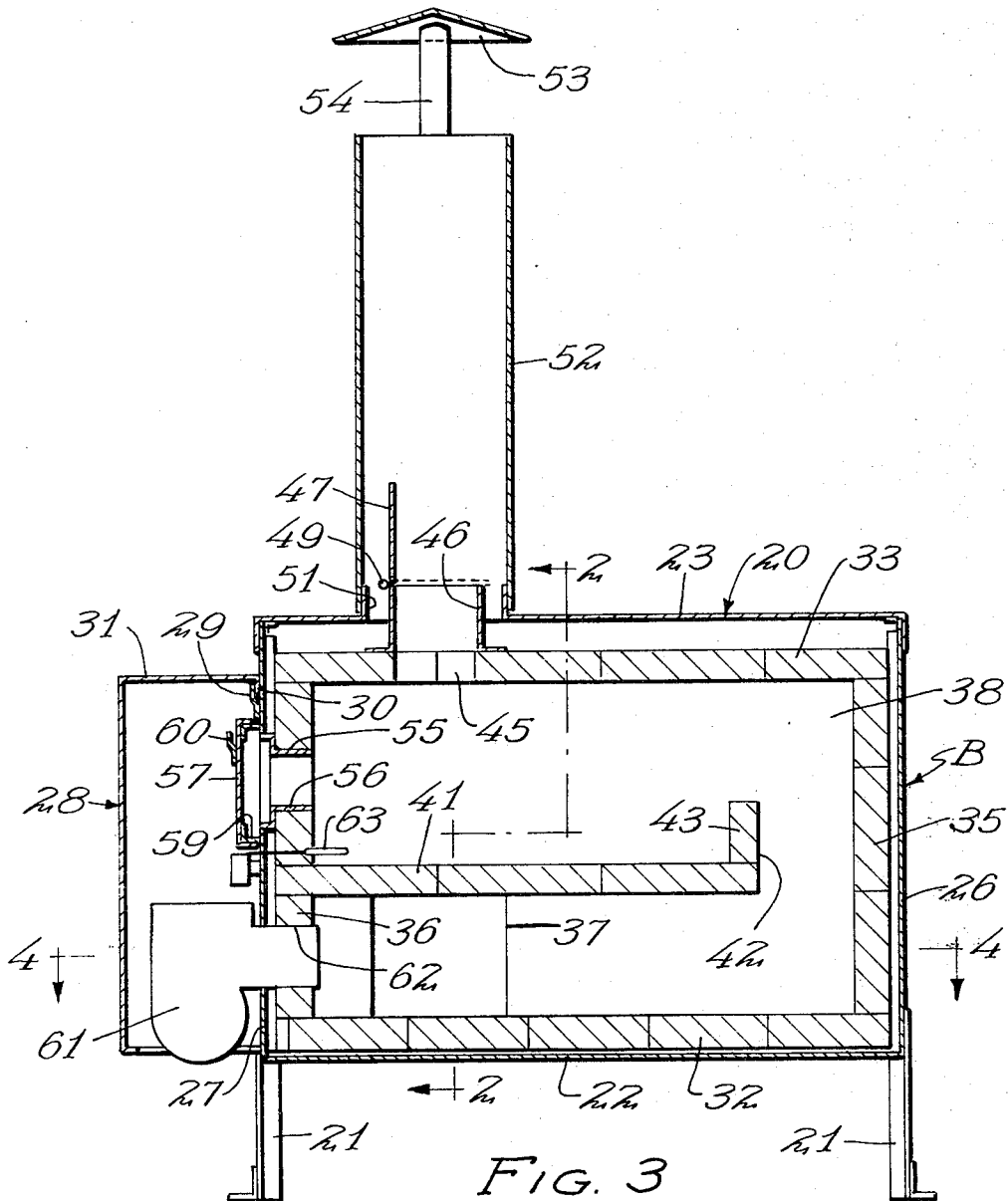
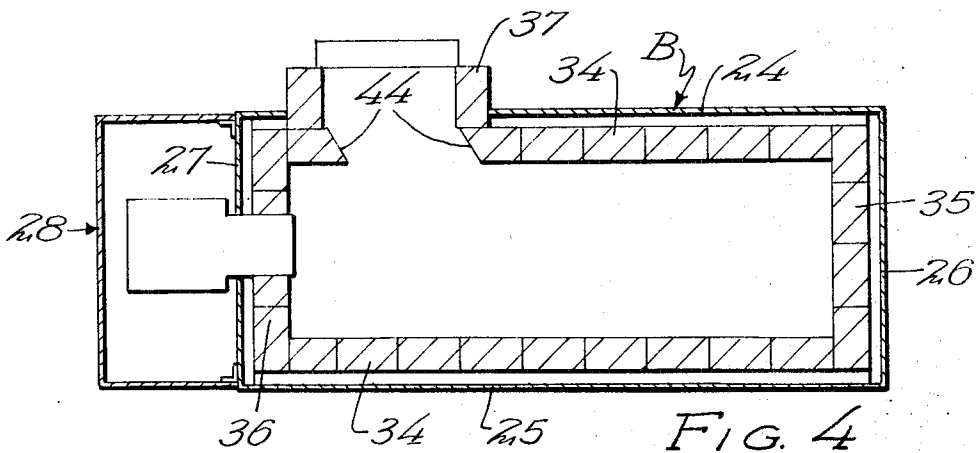
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3,832,144

SMOKE ELIMINATOR

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4 Claims

ABSTRACT OF THE DISCLOSURE

A smoke eliminator is connected to the chimney usually leading from an incinerator or the like. The eliminator includes a chamber capable of withstanding high temperatures. A power burner is provided to pre-heat the chamber. The temperature is sufficient to burn out the major portion of the impurities caused by the firing of the incinerator as the gases travel a tortuous path.

This invention relates to an improvement in smoke eliminators, and deals particularly with an apparatus for removing impurities from smoke normally issuing from incinerators and the like.

BACKGROUND OF THE INVENTION

During recent months, the necessity of decreasing air pollution has become widely acknowledged. Numerous states of the Union have appointed pollution control agencies to set standards to control the amount of impurities which can be eliminated through chimneys into the outer atmosphere. As an example, it was found that incinerators located in apartment houses and the like were responsible for circulating a considerable amount of fly ash and other impurities in the atmosphere. As a result, standards were set up to limit the amount of impurities which could be discharged when the incinerator was in operation. While such standards are presently difficult to enforce because of the lack of adequate control, and the lack of adequate equipment to prevent the pollution, it is inevitable that means must be provided for meeting the standards, and for taking proper action against those who do not meet the standards.

SUMMARY OF THE DISCLOSURE

It has been found that a great percentage of the smoke and impurities can be removed by heating the fumes issuing from the incinerator to a temperature sufficient to burn out the impurities so that the resulting fumes may issue as relatively clean air. For example, by heating the emitted fumes to a temperature of perhaps 1300° to 1400° F. for a predetermined time, virtually all of the impurities may be burned out thus eliminating the issuance of smoke from the incinerators.

It is an object of the present invention to provide a device which is designed for mounting on the top of apartments or the like adjoining the chimneys through which the incinerator fumes are directed. This apparatus is connected to the incinerator chimney through a suitable breeching and the top of the chimney is capped so that all of the fumes must pass through the eliminator. As the fumes enter the eliminator, they are subjected to a blast of heated air from a power gas burner or the like which reheats the fumes to a temperature sufficient to burn out the impurities.

A feature of the present invention resides in the provision of a smoke eliminator including an inlet and an outlet, and a power burner located near the inlet. A temperature sensing device is located near the outlet. Before the incinerator is ignited, the power gas burner is started to heat the smoke eliminator. When the temperature near the outlet of the device reaches a predetermined temper-

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ature, as for example 1300° F., the incinerator is ignited and the fumes which are emitted therefrom are reheated in the eliminator in a manner to remove fly ash and other impurities therefrom.

A feature of the present invention resides in the provision of a smoke eliminator in the shape of an elongated chamber capable of withstanding the temperatures involved, and dividing the interior of the chamber into two chambers by means of a baffle which extends generally horizontally from the inlet end of the chamber and the end supporting the gas burner, to a point spaced from the opposite end wall thereof. The baffle divides the interior of the eliminator into a lower chamber and an upper chamber which are connected by an opening beyond the baffle. The fumes follows a tortuous path, and enter the chamber at the end most remote from the passage connecting the vertically spaced chambers, and is subjected to heat from the power blower and heater at the same end of the lower chamber. With this arrangement, the emitted fumes must pass beneath the baffle to the passage connecting the chambers, and must then move in a reverse direction above the baffle to the end of the upper chamber above the inlet. The fumes are then permitted to discharge through a suitable upright discharge flue.

A feature of the present invention resides in the provision of a heat sensing device located in the upper of the two chambers near the outlet end thereof. The positioning of the heat sensor insures the fact that both chambers are thoroughly heated to the necessary temperature. The heat sensor functions, when the necessary temperature is attained, to light a signal light in the boiler room so that the ignition of the incinerator may be instigated. Alternatively, the actuation of the heat sensing device could automatically start the incinerator in operation.

These and other objects and novel features of the present invention will be more clearly and fully set forth within the scope of the following specification and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic view indicating a building of several floors with an incinerator at the lowest floor and the smoke eliminator above the uppermost floor.

FIG. 2 is a partial transverse sectional view through the apparatus, the position of the section being indicated in general by the line 2—2 of FIG. 3.

FIG. 3 is a longitudinal sectional view through the smoke eliminator, the section being taken substantially at the center line of the device.

FIG. 4 is a horizontal sectional view of the lower portion of the smoke eliminator, the position of the section being indicated by the line 4—4 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As is diagrammatically illustrated in FIGS. 1 of the drawings, a building A is indicated having a basement floor 10, a first floor 11, a second floor 12, and a top floor 13. An incinerator flue 14 or chimney extends from an incinerator 15 through the various floors to terminate in an upwardly extending chimney portion 16. The chimney 14 is provided with a series of dump chutes 17 through which trash and other material to be burned may be directed. The chutes 17 are normally closed by doors 19 which are opened only when material is to be dumped into the chimney 14. At intervals, the incinerator 15 is fired to burn the materials collected. The incinerator 15 is not shown in any detail, as such devices vary considerably in shape and form. It is believed sufficient for the present application to indicate that the incinerator is actuated by suitable heat producing means such as a gas burner.

The smoke eliminator is indicated in general by the letter B, and is shown as mounted upon the upper floor or roof 13. The eliminator B includes a housing 20 supported by legs such as 21 or other suitable means. In the particular form of construction illustrated, the housing 20 includes a bottom panel 22, a top panel 23, and side wall panels 24 and 25 connecting the top and bottom panels 22 and 23. A rear wall panel 26 closes one end of the housing. A front wall 27 closes the opposite end thereof. A detachable box-like member 28 is mounted upon the front wall panel 27 by suitable means such as the bracket 29 into which the downturned flange 30 of the top wall 31 of the enclosure 28 may engage. The purpose of the enclosure 28 is merely to provide protection for the various elements mounted upon the front wall 27.

A compartment 38 capable of withstanding temperatures in excess of 1400° F. is provided within the outer housing 20. This interior compartment 38 is preferably formed of fire brick or other material capable of experiencing the high temperatures. The compartment includes a bottom wall 32, a top wall 33, and side walls 34. The compartment also includes a rear wall 35 and a front wall 36. The various compartment walls are preferably either insulated from the outer casing, or spaced therefrom in order to protect the outer casing from the high temperatures.

As indicated in FIGS. 2 and 4 of the drawings, the side wall 34 inwardly of the outer casing side wall 24 is provided with a tubular inlet 37 also formed of heat resistant material such as fire brick. The inlet 37 is connected by a suitable breeching 39 (See FIG. 1) to the interior of the upper chimney portion 16. The chimney portion 16 is capped as indicated at 40 so that all of the fumes from the incinerator must pass through the smoke eliminator.

A partition or baffle wall 41 extends across the compartment 38 between the side walls 34. This baffle wall extends from one side wall to the other, and terminates short of the rear wall 35 to provide a passage 42. Preferably, the baffle wall 41 is provided at its rear extremity with an upwardly extending wall member 43 over which the rising gases must flow. The side edges 44 of the inlet 37 may be inclined as indicated in FIG. 4 so as to assist in directing the flue gases longitudinal of the compartment 38.

The upper compartment wall 33 is provided with an exhaust opening 45 which may be surrounded by a short outlet flue 46. A damper 47 is hingedly supported at the top of the flue as indicated at 49. This damper is open at all times except when the smoke eliminator is being cleaned. A counter weighted shaft 50 is secured to the hinge portion 49 of the damper to hold it in open position except when it is manually closed.

The top panel 23 of the outer housing 20 is provided with an upwardly extending sleeve 51 having an opening therethrough. The sleeve 51 is preferably concentric with the flue member 46. A hollow cylindrical stack 52 encircles the sleeve 51 and extends upwardly to form a vertical flue. Preferably a hood 53 is supported above the flue 52 by suitable supporting means such as 54 to prevent rain and snow from entering the stack 52.

The front wall 36 is preferably provided with an aperture 55 which may include a lining sleeve 56 if it is so desired. The aperture 55 is preferably closed by a cap like closure 57 mounted on a bracket 59 extending forwardly from the front panel 27 of the outer housing 20. The closure 57 is normally frictionally held in place, but is removable when desired to gain access to the opening 55. A bracket 60 may be provided on the outside of the closure 57 to assist in removing the cap when it is desired.

A power gas blower 61 is supported within the enclosure 28 and includes an outlet duct 62 which extends through the front wall 36 of the compartment below the baffle wall 41. This burner 61 is capable of developing a very high temperature within the compartment. A heat sensor 63 is mounted upon the front wall 36 of the compartment above the baffle wall 41.

While not specifically illustrated in the drawings the burner 61 is controlled by suitable control means located adjacent to the incinerator 15. A signal light is also provided near the same location, the signal light being actuated when the heat sensing device 63 senses a temperature of perhaps 1300° F.

The operating switch for the gas heater 61 closes a circuit through a suitable timer to the motor of the gas burner 61. This acts to preheat the eliminator B. When the temperature reaches a predetermined degree, such as 1300° F., the signal light in the boiler room is actuated. The operator then turns on the incinerator to start the operation. Alternatively, the incinerator could be automatically turned on when the proper degree of temperature is sensed.

As the material within the incinerator is burned, the fumes pass up the chimney 14, and through the breeching 39 to the smoke eliminator B. Here the fumes pass beneath the baffle wall 41, through the vertical passage 42, and back over the baffle wall 41 to the exhaust opening 45. During this time, the smoke is heated to the extent necessary to burn out fly ash and other impurities so that the gases leaving the flue 52 contain well below the minimum standards set by various air pollution bureaus and by the standards set by the Incinerator Institute of America.

Any solid material which settles out may be removed through the access opening 55. However, because of the high temperatures involved, almost all of the material is removed in the smoke eliminator.

In accordance with the Patent Statutes, I have described the principles of construction and operation of my improvement in smoke eliminator, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

The claims:

1. A smoke eliminator adapted for connection to the upper end of a chimney comprising:

a elongated metal chamber lined with a material capable of withstanding high temperatures, said chamber being generally rectangular having generally parallel sides, generally parallel ends, and parallel top and bottom;

a baffle wall extending generally horizontally along the elongated axis of the chamber between opposite sides thereof intermediate the top and bottom so as to form a narrow lower mixing chamber and an upper expansion chamber, said baffle wall extending from one end to a point spaced from the opposite end by a distance such as to form a constricted passage from the mixing chamber to the expansion chamber, said constricted passage having a cross sectional area less than the cross sectional area of the lower chamber so as to insure mixing in the mixing chamber, said baffle having an upward extending wall at the constricted passage end so as to retain ash settling out in the expansion chamber, said expansion chamber having a cross sectional area substantially larger than that of the constricted passage so as to slow the gases passing therethrough and allow ashes to settle on said baffle, said mixing chamber including an inlet for smoke beneath said baffle wall adjoining said one end, and an outlet in the top of the expansion chamber above said one end, said outlet also forming a constriction for communication with the chimney; and

a power gas burner at said one end of said mixing chamber capable of directing a heated flame into said mixing chamber sufficient to raise the temperature within said mixing chamber to approximately 1300° F.

2. The structure of Claim 1 and in which said outlet is connected to a vertical flue member.

3. The structure of Claim 1 including a heat sensor at said one end of said chamber just above said baffle wall

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in the ash settling area capable of actuating a signal when the temperature within said chamber reaches approximately 1300° F.

4. The structure of Claim 1 and including a clean-out opening in said one end of said chamber above said baffle wall.

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