

Feb. 2, 1971

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3,560,165

FLUE SMOKE INCINERATOR

Filed Sept. 24, 1969

2 Sheets-Sheet 1

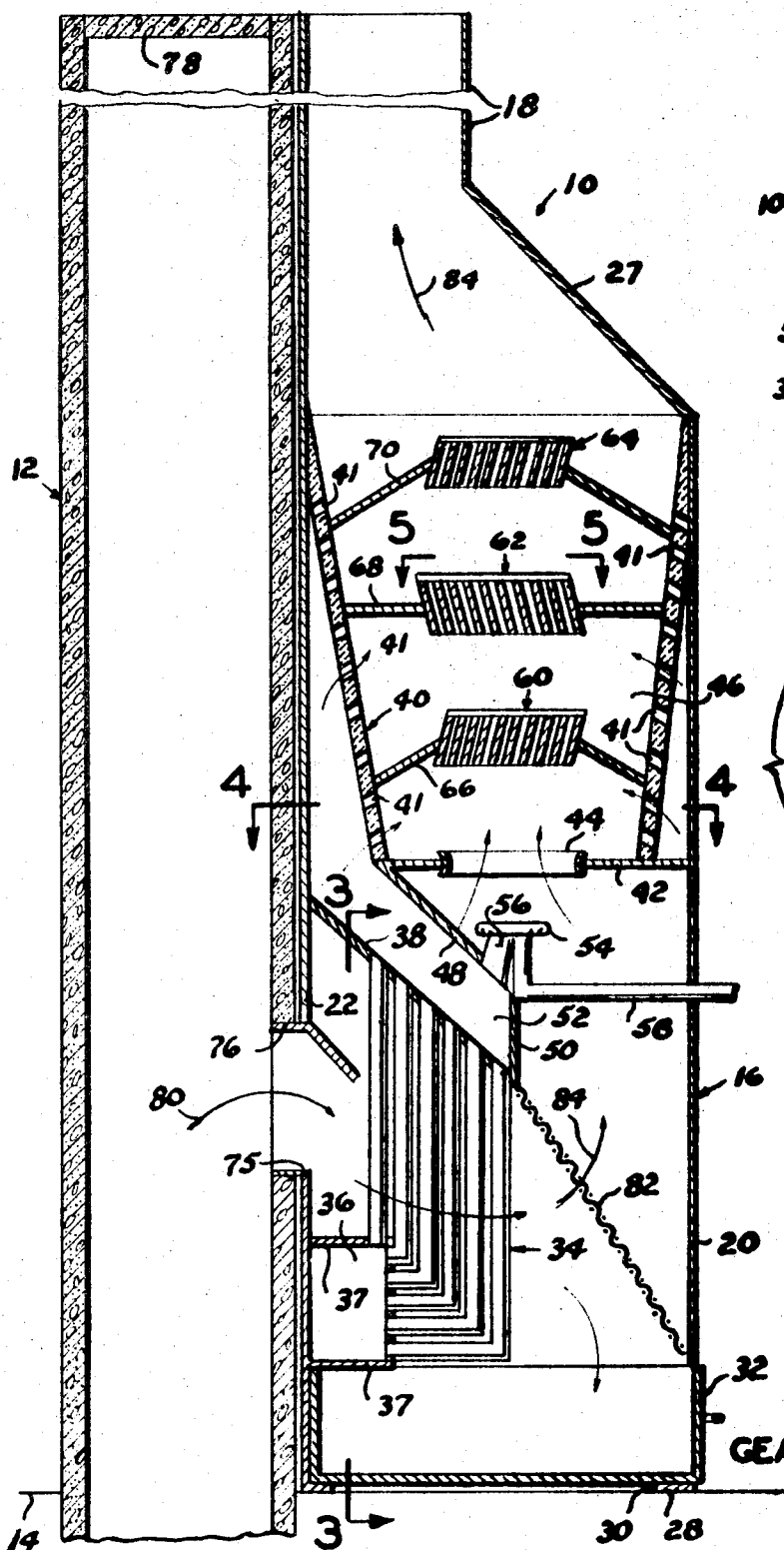


FIG. 2

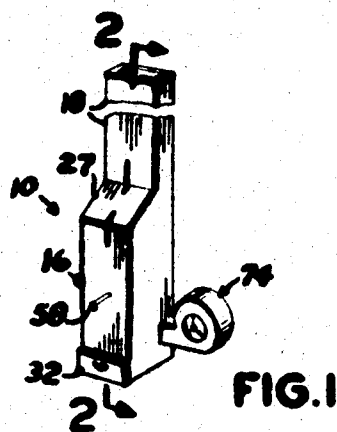


FIG. 1

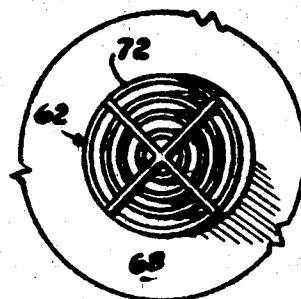


FIG. 5

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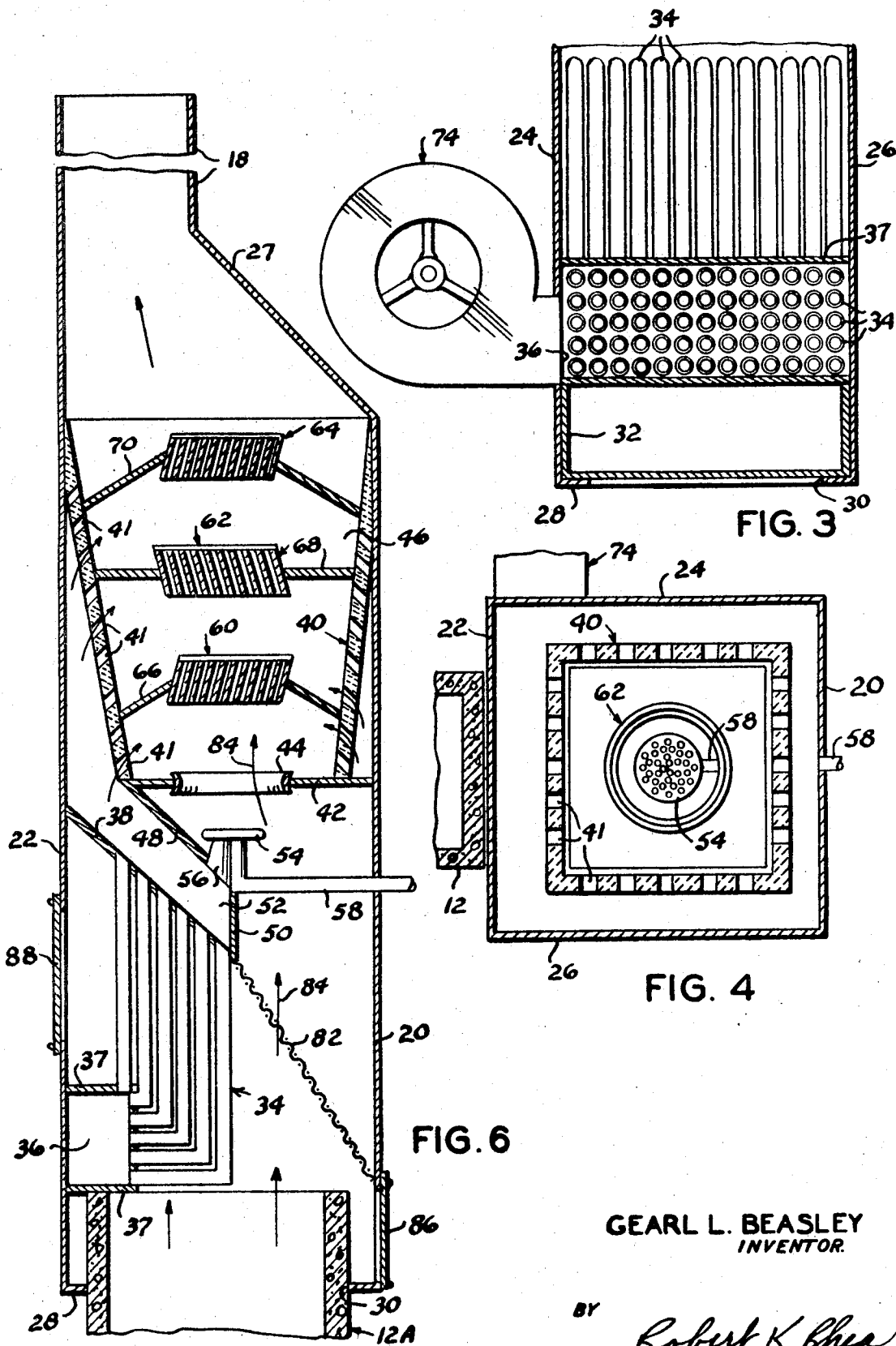


FIG. 4

FIG. 6

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U.S. Cl. 23—277

4 Claims

ABSTRACT OF THE DISCLOSURE

An upright housing forms a gas passageway communicating with the exhaust of a flue for receiving its heated gases. A heat exchanger, near the inlet end of the housing, reduces the temperature of the flue gases. Means within the housing gas passageway direct the flue gases toward burner means which initiate combustion of the unburned hydrocarbons in the flue gases while additional air, supplied by the heat exchanger means, supplements the oxygen content of the flue gases as they progress through the burner means to maintain combustion.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention relates to afterburners and more particularly to a combustion chamber for use with primary combustion devices such as incinerators or industrial flues.

Air pollution has become a major health problem in most larger metropolitan areas primarily as a result of inefficient burning of fuel or waste in primary combustion chambers. This inefficient burning results in large quantities of hydrocarbons suspended in the exhaust gases or smoke as well as larger particles which remains suspended in the atmosphere and in some instances settles out on buildings, or the like, in the form of soot. Various attempts have been made to eliminate this air pollution such as by utilizing an electrostatic type smoke eliminator for large flues which are intended to remove particles of carbon from the smoke stream, however, such devices are relatively expensive and require frequent maintenance to maintain their efficiency. Other attempts have been made to provide secondary burners to continue the combustion of exhaust gases but these devices, for the most part, have not been generally accepted. One of the reasons being that to attain efficient burning of exhaust gases it is desirable that the temperature of the gases be reduced and mixed with additional air to initiate and continue the afterburning.

This invention provides a novel means forming a heat exchanger which in addition to reducing the smoke stream temperature provides a large quantity of additional air which is progressively added to the smoke stream as it is moved through burner means.

(2) Description of the prior art

The most pertinent prior art is Pats. Nos. 2,879,862; 2,996,143 and 3,408,167.

The principal distinction of this invention over these patents is the heat exchanger means for reducing the temperature of exhaust gases while simultaneously supplying additional air to maintain secondary combustion.

SUMMARY OF THE INVENTION

An upright substantially rectangular housing is placed in communication, at its depending end portion, with an outlet of a flue. A restricted gas passageway within the housing is provided with a plurality of vertically arranged burner means. A heat exchanger, below the burner means in the path of the smoke stream, reduces the temperature

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of the flue gases and forms a fresh air chamber surrounding and communicating with the gas passageway. A fan, outwardly of the housing, moves atmospheric air through the heat exchanger and the fresh air chamber.

The principal object is to provide a means for initiating and maintaining burning of unburned hydrocarbons in suspension in a smoke stream.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of the device, per se;

FIG. 2 is a fragmentary vertical cross-sectional view of the device, to an enlarged scale, taken substantially along the line 2—2 of FIG. 1 and connected with the exhaust end portion of a flue;

FIG. 3 is a vertical cross-sectional view, partially in elevation, taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a horizontal cross-sectional view taken substantially along the line 4—4 of FIG. 2;

FIG. 5 is a top view of one of the burner means looking in the direction of the arrows 5—5 of FIG. 2; and,

FIG. 6 is a fragmentary vertical cross-sectional view of an alternative embodiment of the device mounted on the exhaust end of a flue.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Like characters of reference designate like parts in those figures of the drawings in which they occur.

In the drawings:

The reference numeral 10 indicates the device, as a whole, adapted to be connected with existing burned gases exhaust stacks or flues, such as the flue 12, above a roof line 14. The device 10 includes a housing 16 which is upright rectangular in general configuration terminating upwardly in a reduced end portion forming a stack-like neck portion 18 for exhausting burned gases. The depending end portion 16 is defined by front and rearward walls 20 and 22 integrally joined to side walls 24 and 26. Spaced upwardly from its depending end the front and side walls are inclined upwardly toward the rear wall 22, as at 27, to form the neck 18. An inwardly projecting flange 28, connected with the respective front, rearward and side walls, defines an opening 30 in the bottom of the housing for the purposes presently explained.

Adjacent its depending end the front wall 20 is apertured for removably receiving an upwardly open drawer-like tray or bin 32 substantially equal to the inside dimensions of the housing 16. A heat exchange unit, comprising a plurality of generally vertically disposed tubes 34, is positioned within the housing in inwardly spaced relation with respect to the back wall 22. The depending end portion of the tubes are horizontally disposed and open into an air inlet chamber 36 formed by rectangular walls 37 connected with the inner surface of the back wall 22 above the bin 32.

An inverted truncated conical-shape, in vertical cross-section, wall 40, formed of fire brick or other refractory material, having a plurality of apertures 1, is fomed within the housing 16 above the heat exchange unit and is supported by a horizontal plate 42 having an aperture 44 to define a combustion chamber 46 for the device 10. The upper ends of the tubes 34 extend through a partition 38 connected with the back wall 22 and extending inwardly and downwardly toward the center of the housing 16. A dividing wall 48, connected with the horizontal wall 42, extends angularly inward and downward, parallel with the inclined wall 38, and is connected with an end plate 50 joining the walls 38 and 48 to form a fresh air chamber 52 opening upwardly adjacent

