

[54] FUME INCINERATOR

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110/49, 110/42, 431/5, 126/79, 165/70

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[58] Field of Search 23/277, 281;
110/8 A, 49, 42; 431/5; 126/79; 165/70

[56] References Cited

UNITED STATES PATENTS

1,857,364	5/1932	De Rachal	110/49 R
3,658,482	4/1972	Evans et al.	23/284

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[57] ABSTRACT

A fume incinerator for afterburning fumes containing air polluting elements includes a casing having a burner disposed in a combustion chamber. The casing includes an outer compartment which is sealed from the combustion chamber and provides a dead air space between the combustion chamber and the outer walls of the casing. A blower receiving fumes from an industrial process or apparatus directs the fumes into the combustion chamber. A conduit in communication with the dead air chamber is in communication with the suction conduit of the blower so that any fumes which may leak into the dead air space or chamber are immediately removed and returned into the combustion chamber, thus preventing leakage of the same through the outer walls of the casing and into the atmosphere.

4 Claims, 2 Drawing Figures

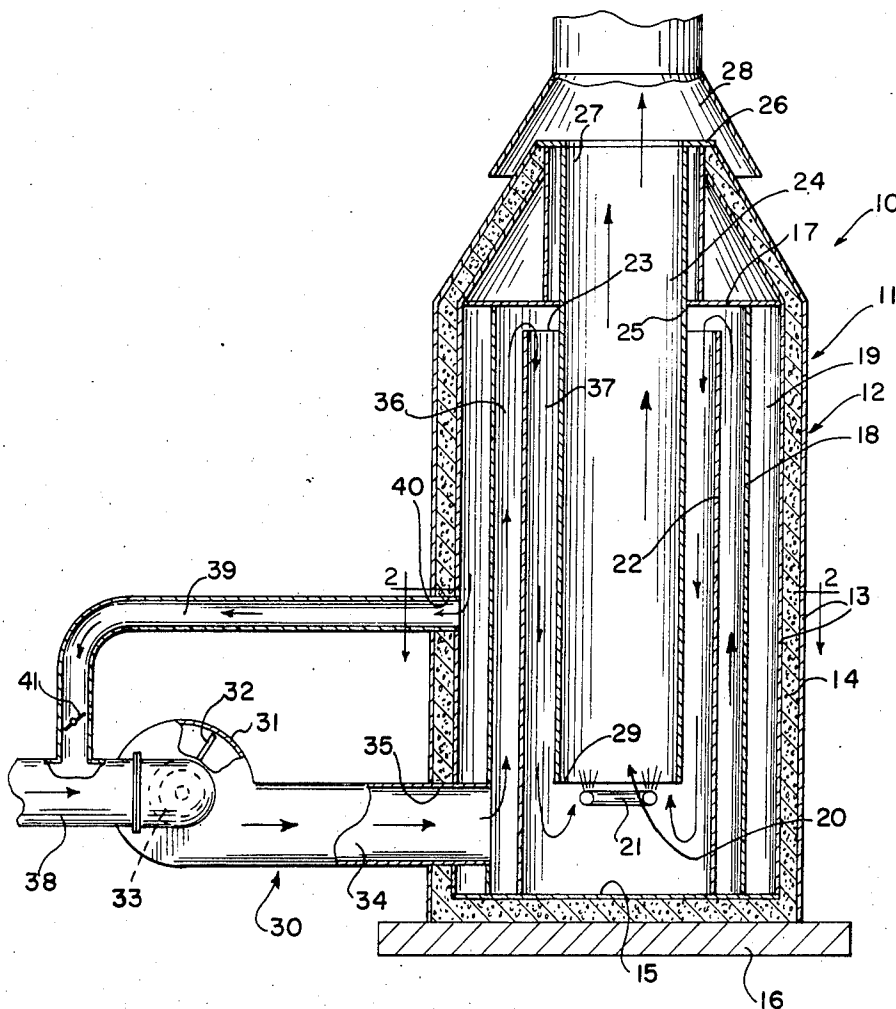


FIG. 1.

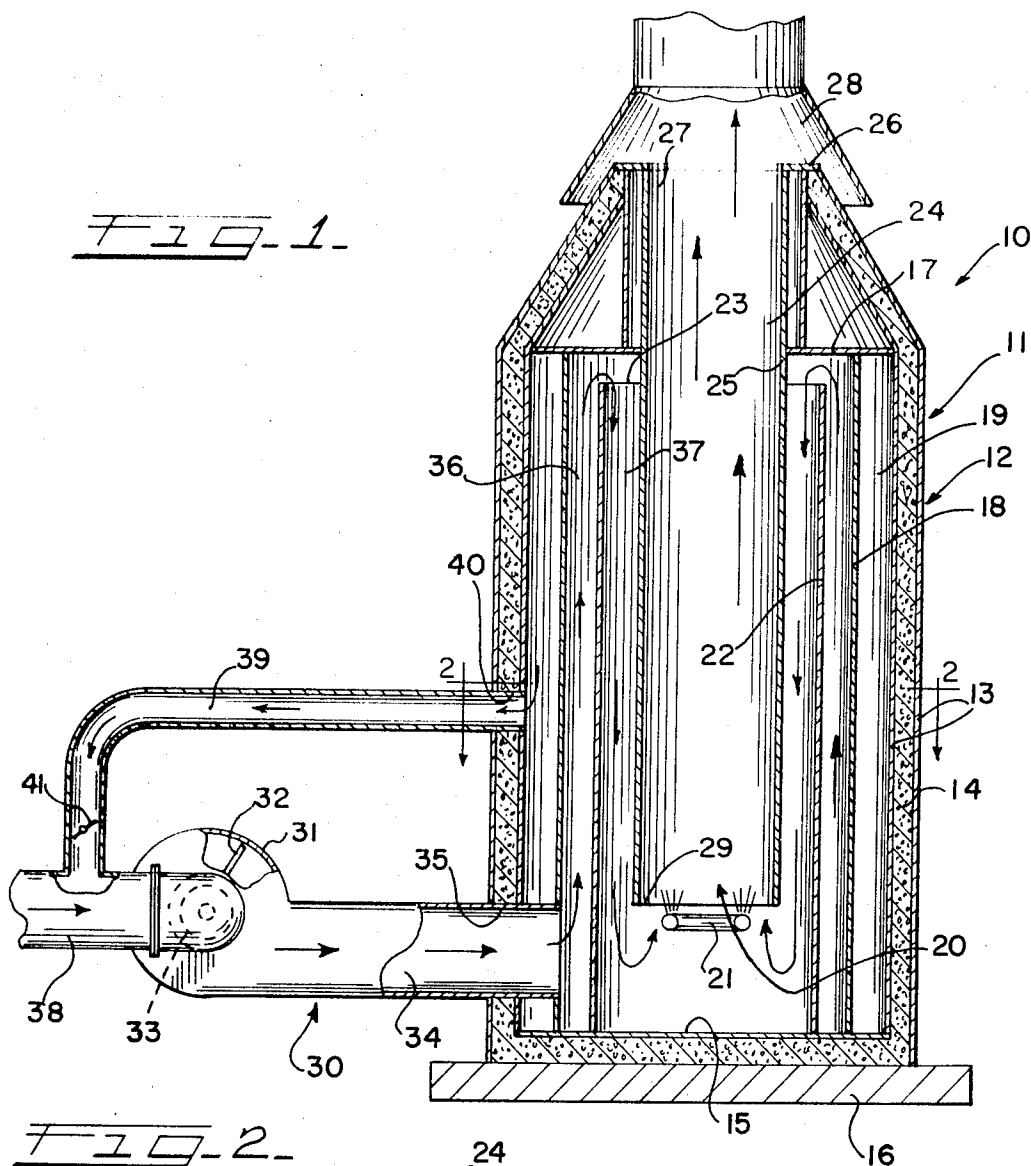
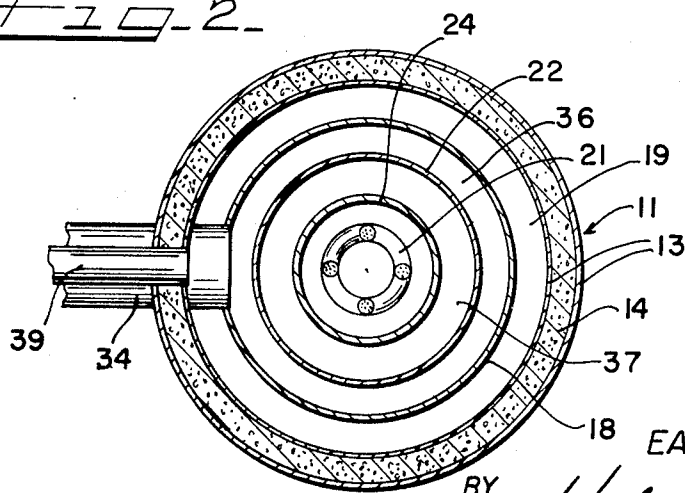


FIG. 2.



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FUME INCINERATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of art to which this invention pertains is that of secondary combustion devices or afterburners for incinerating pollutant causing fumes resulting from industrial processes.

2. Description of the Prior Art

Afterburners or more commonly designated incinerators, are well known in the art for receiving and burning fumes from industrial processes. Such devices are disclosed in the U.S. Pat. Nos. 2,879,862 of Mar. 31, 1959 and 3,511,224 of May 12, 1970.

SUMMARY

It is the primary purpose of the present invention to more effectively and efficiently incinerate industrial fumes by means of a fume incinerator which is designed to prevent the inadvertent escape of fumes from the incinerator prior to their incineration. The present invention comprises a casing which is divided into a combustion chamber and a dead air chamber by means of a tubular wall laterally spaced from the outer wall of the casing. The dead air chamber, while it is substantially sealed with respect to the combustion chamber, nevertheless, because of the high pressure and heat to which the incinerator is subjected, provides a space for receiving fumes which may be leaked as a result of the operation. In the prior art devices no provision is made to prevent occasional leakage which cannot be prevented even though the walls of the casing are effectively welded together. The dead air chamber is in communication, by means of a conduit, with the suction inlet of a blower arrangement which returns any of the leaked fumes into the system and back into the combustion chamber for incineration.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view through a fume incinerator showing a blower arrangement; and

FIG. 2 is a cross-sectional view taken substantially along the line 2—2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A fume incinerator or afterburner is generally designated by the reference character 10 and comprises an outer casing 11 having an outer wall structure 12. The outer wall structure 12 is of sandwich type configuration including spaced walls 13 within which heat insulation 14 is provided. The outer wall structure 12 is of hollow or tubular shape, but may be rectangular or cylindrical as desired, and includes a bottom wall 15 supported on a base 16 also having a sandwich type of insulation arrangement therewith. A top wall 17 has its peripheral edge connected to the innermost wall 13, the connection of all of the elements of the incinerator being suitably accomplished by conventional welding or brazing. An inner wall structure is designated at 18 and provides in effect a first tubular or dead air chamber 19 laterally spaced with respect to the outer wall structure 12. The inner wall structure 18 also provides a combustion chamber generally designated at 20 within which a burner coil 21 is positioned. The burner coil 21 may be of conventional gas or electrical type which is well known in the art. A tubular baffle member

22 is connected to the bottom wall 15 and has its upper end 23 vertically spaced from the top wall 17. A tubular member 24 projects upwardly through an opening 25 in the top plate 17 and downwardly adjacent to the burner 21. The tubular member 24 is provided with an upper open end 27 adapted to communicate with a stack or flue 28 open to the air in conventional fashion. The tubular member 24 is also provided with a lower open end 29 immediately above the burner 21.

A blower arrangement 30 includes a fan casing 31 within which a conventional fan 32 is disposed. The fan 32 is suitably supported for rotation within the fan casing 31 and is driven by a suitable electric motor generally designated at 33 conventional in the art. The blower arrangement 30 includes a discharge conduit 34 which projects through an opening 35 in the outer wall structure 12 and opens into a tubular passage 36 formed inwardly of the inner wall structure 18 within the combustion chamber 20. As shown in FIG. 1, the passage 36 is in communication with a passage 37 disposed between the wall structure 18 and the tubular member 24. Fumes from an industrial process are sucked into a suction conduit 38 into the fan casing 31 and through the conduit 34 into the combustion chamber 20. A conduit 39 extends through an opening 40 in the outer structure 12 and communicates with the chamber 19. A manually regulatable butterfly valve 41 is positioned within the conduit 39 for regulating the amount of negative pressure developed in conduit 39.

THE OPERATION

The present invention has as its primary object to more efficiently eliminate pollutants from the air by a conventional incinerating process. Fume incinerators are generally used to incinerate gases and fumes containing pollutant irritants resulting from industrial processes so that they do not escape into the atmosphere. Fumes in these incinerators are generally subject to approximately 1,400°F. and over and thus the pollutants are consumed by heat during incineration. The fumes are retained in said temperature for approximately 0.5 seconds and then are discharged through a conventional stack or chimney. Because of the high pressures and heat it is virtually impossible to eliminate leakage from the incinerator unit when conventionally constructed. Despite advanced welding or brazing techniques there still is some leakage of fumes which cannot be eliminated by standard designs. Such leakage can well occur in the areas above the connection of the inlet or discharge tubes through the outer wall structure, or it can occur through any of the connected joints of the various sheet metal welded parts. In the present construction the blower arrangement 30 provides for suction to remove the fumes from the suction conduit 38 into the combustion chamber where as indicated by the arrows the fumes travel upwardly through the passage 36 then downwardly through the passage 37 whereupon they are incinerated by the heat of the burner 21 and then passed through the tubular member 24 and stack 28 to the atmosphere. By the provision of the conduit 39 fumes which may leak into the chamber 18 are removed from the chamber and returned through the conduit 39 into the suction conduit 38 and back into the combustion chamber for incineration. Thus the pressure which would normally build up within the unit to cause leakage of fumes cannot occur since it is relieved by the dead air chamber and by the

conduit 39 in communication with the blower 30. The negative pressure built up within the conduit 39 during operation of the fan 30 permits the immediate and constant removal of fumes from the dead air chamber 19 which would normally leak outwardly of the unit and thus contribute to pollution of the atmosphere. Thus it is apparent that the present invention provides for improved anti-polluting incineration of fumes which are a result of industrial processing.

What is claimed is:

1. An incinerator for burning gaseous fumes comprising,
 - a casing having an outer wall structure,
 - an inner wall structure substantially coextensive with and laterally spaced inwardly of said outer wall structure to define a closed dead air chamber between said wall structures,
 - a combustion chamber coextensive with and laterally spaced inwardly of said inner wall structure,
 - a burner unit disposed within said combustion chamber,
 - said dead air chamber and said combustion chamber being sealed relative to each other to prohibit substantial communication therebetween,
 - a discharge stack communicating with an upper portion of said combustion chamber,
 - blower means including a fan housing and a power driven fan therein,
 - a first conduit communicating with said fan housing and with a source of fumes,

a discharge conduit communicating with said fan housing and said combustion chamber for discharging fumes thereto, and

a third conduit connected to said dead air chamber and said first conduit to return gases leaking into said dead air chamber from said combustion chamber to said fan housing and through said second conduit into said combustion chamber.

2. The invention in accordance with claim 1, said outer wall structure comprising laterally spaced vertical walls including heat insulating means therebetween,

and said second conduit extending through said outer wall structure and communicating with said combustion chamber.

3. The invention in accordance with claim 1, said combustion chamber including a cylindrical vertical baffle means spaced inwardly relative to said inner wall structure to guide said incoming fumes in maze-like fashion into proximity of said burner unit.

4. The invention in accordance with claim 3, including a tubular element concentric with said baffle and laterally spaced with respect thereto having an upper open end communicating with said stack and a lower open end disposed adjacent to and above said burner unit, and valve means in said third conduit.

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