

[54] SMOKE CONTROL DEVICE

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[58] Field of Search. 110/8 A, 8 R, 163, 110/147

[56]

References Cited

UNITED STATES PATENTS

3,310,009	3/1967	Jacobs	110/8
3,524,418	8/1970	Cowan	110/163 X
3,682,599	8/1972	Hewitt	110/8 X

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[57]

ABSTRACT

An antipollution or smoke control device comprising an afterburner for the output of an incinerator that has means controlling combustion to meet pollution control standards of the various pollution control agencies.

7 Claims, 2 Drawing Figures

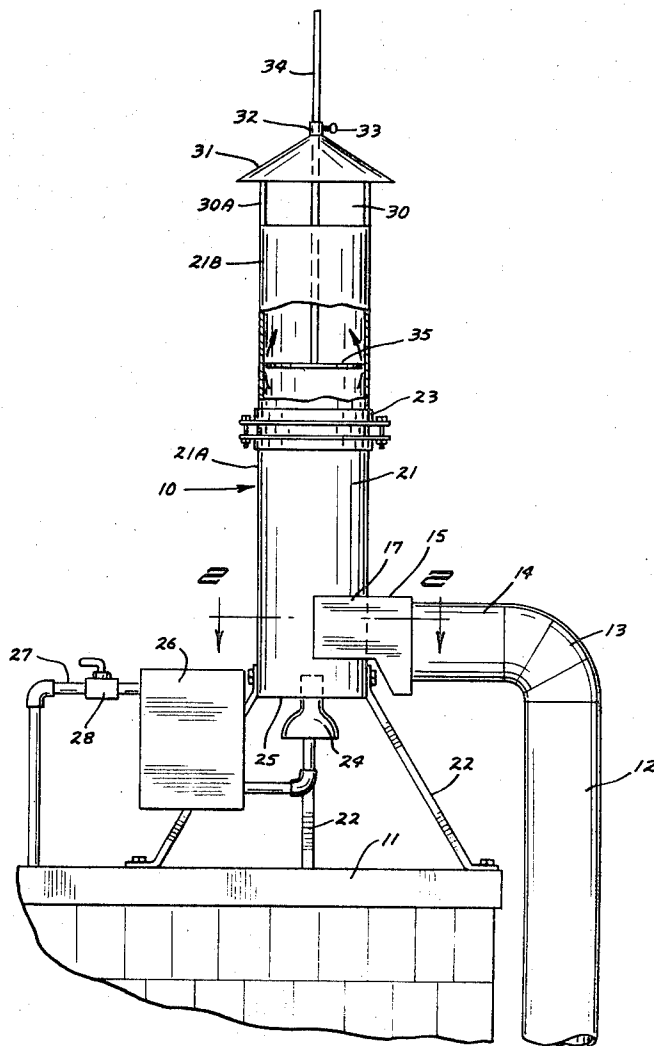


FIG. 1

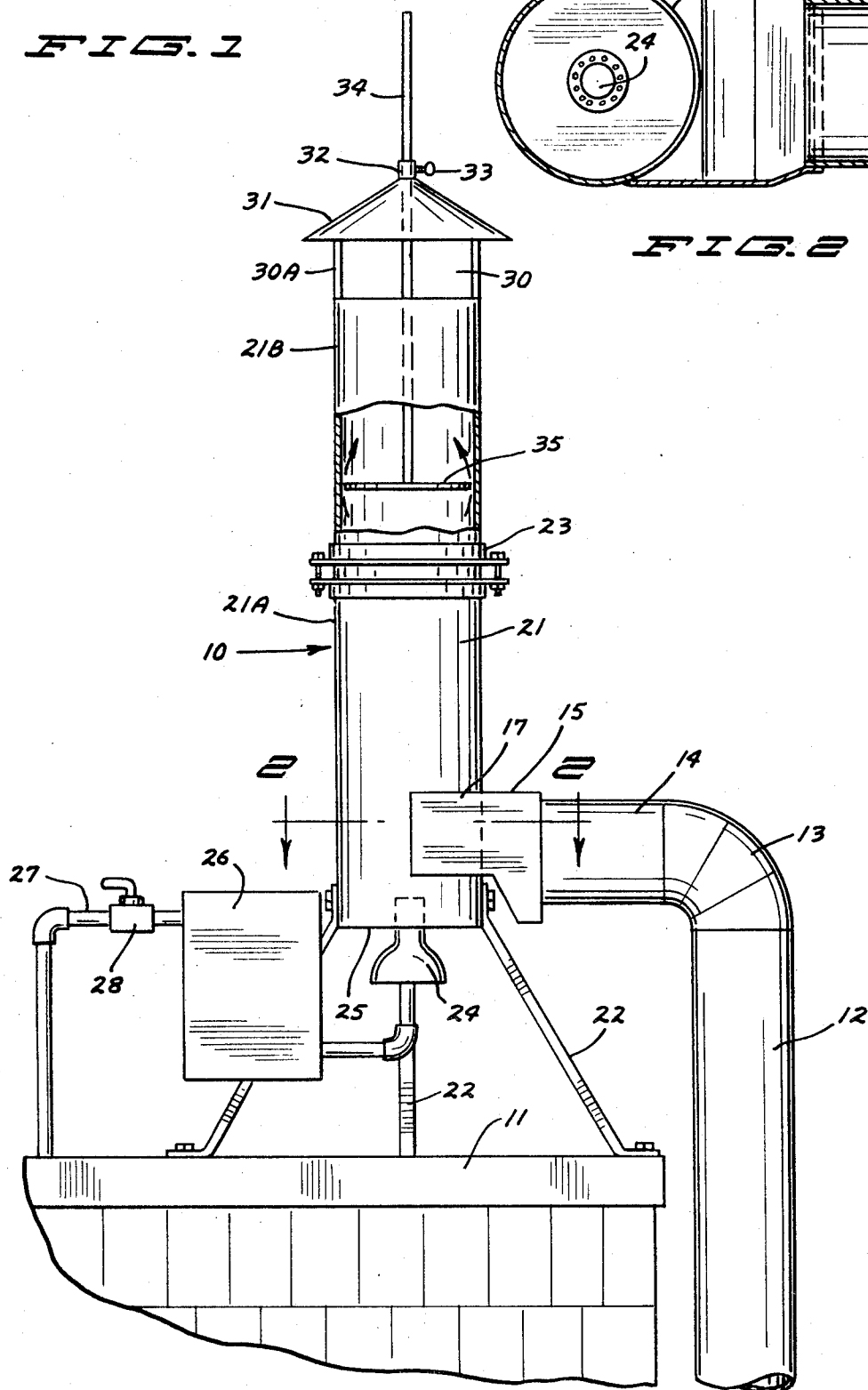
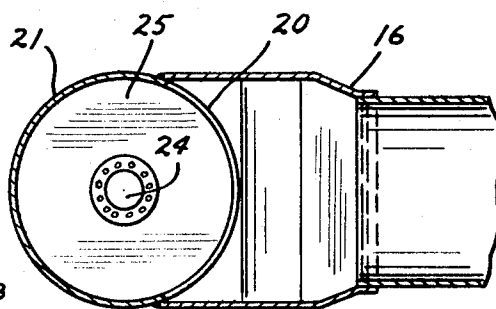


FIG. 2

SMOKE CONTROL DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a smoke control anti-pollution device forming an afterburner for incinerators.

2. Prior Art

At the present time the emphasis on pollution control of course is increasing. Various incinerators for burning various forms of solid waste have been advanced, but meeting the odor and solid material content discharge regulations as well as meeting the regulations for other obnoxious gases is difficult.

The present devices on the market fail to provide adjustable and variously operable means for giving complete combustion so that the output of the stack of an incinerator is sufficiently low in polluting elements to meet existing pollution control standards.

SUMMARY OF THE INVENTION

The present invention relates to a pollution control device which is connected to the output of conventional incinerators, and receives the smoke and gases discharge from the incinerator. The pollution control device comprises an afterburner that has means for breaking up the smoke in an area so that it readily burns, and providing a burner that produces sufficient heat to combust the elements in the smoke. The burning chamber includes an adjustable baffle that permits adjustment so that the size of the combustion chamber can be varied effectively for insuring that complete combustion occurs. The chamber discharges past the baffle into the atmosphere. The burner or heat source can be of any conventional design utilizing natural gas generally for combustion fuel, and has normal controls for suitable operation so that the rate of combustion can be regulated. The baffle also insures that the downstream temperatures from the combustion chamber are maintained at a low enough level to meet existing standards, and the rate of combustion of the burner can be adjusted as desired.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of an afterburner smoke control device made according to the present invention in parts in section and parts broken away; and

FIG. 2 is a sectional view taken as on line 2—2 in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A antipollution device illustrated generally at 10 comprises an afterburner assembly and is mounted onto the top of a supporting structure 11. The supporting structure can be on the roof of a building or can be any other suitable support.

A round tubular smoke pipe 12 leads from an incinerator (not shown) and carries smoke which is higher in pollutants than existing pollution standards. The pipe 12 is approximately 10 inches round in the example shown, but of course can be of any desired diameter. The pipe 12 has an elbow 13 that leads into the short pipe section 14, and the section 14 is connected into a transition section 15 that has suitable guide portions 16 that make a transition from the 10 inch round piece

into a rectangular input throat 17. The rectangular throat 17 is as shown approximately 6 inches in vertical direction (axial direction of the main chamber) and 12 inches across.

The rectangular section opens through a provided opening 20 in a combustion housing 21 that forms, as shown, a round pipe, although the combustion housing could also be rectangular if desired. The combustion housing 21 has an upright axis extending in upright direction, and is supported with suitable braces or legs 22 down to the support 11. The combustion housing is elongated, and can be made into suitable sections 21A and 21B using clamps 23 to fasten the sections together if desired. A gas burner 24 of suitable design is mounted to the bottom of the housing 21, and a plate 25 can be used for closing off the bottom of the housing. This plate could have damper controls for regulating input air if desired. The burner itself 24 has openings in the lower portion thereof for controlling air flow to the burner so that the desired amount of air for combustion at the burner can be provided.

The burner can be any desired type of unit approved by the American Gas Association, or local existing codes. The burner should have a capacity to produce large amount of heat, for example a burner in the range of 450,000 BTU'S has been found adequate. A suitable spark ignition device with automatic relays can be installed in the burner in the usual manner, and the controls 26 for operating the burner can lead from suitable power source so that the burner has a safety pilot light, and a thermo couple sensing unit for the pilot light. These devices can be built right into the burner, and are not shown for sake of clarity because they are conventional. A pipe 27 leads from a source of gas or fuel and has a shut-off valve 28. The controls 26 are of ordinary ignition controls that are usual in the regular installation of gas burners. The source of fuel of course could be natural gas or liquid petroleum gas, or other sources of fuel.

The upper portion of the housing 21 has a discharge opening 30 defined therein. This normally would be substantially all the way around the chamber, with supports 30A extending up to support a cover 31 of usual design. A collar 32 is mounted in the center of the cover 31, and has a set screw 33 threaded thereinto. A rod 34 is slidably mounted through the center of the collar and carries a disc type baffle 35 that is positioned on the interior of the upper portions of the housing 21. This baffle 35 has a small amount of clearance around its edges with respect to the interior of the housing and can have relief holes in it if desired. The baffle can be adjusted in longitudinal axial direction of the burner housing to effectively control the size of the combustion chamber. The baffle adjustment in relation to the amount of smoke coming from the pipe 12 and the heat coming from the burner 24 provide a means for controlling the completeness of combustion inside the burner housing 21 so that the emissions from opening 30 are within the necessary limits.

The baffle also forms a heat block to prevent the hot gases from the burner 24 and combustion chamber from being blown directly out of the housing through the opening 30.

The temperature downstream of the baffle, or in other words toward the opening 30 from the baffle 35 is regulated to be about 950°F. The baffle is made of stainless steel to take the high temperatures and it

causes the smoke inside the combustion chamber formed below the baffle to diffuse and come in contact with the flame from burner 24. The baffle adjustability of course insures that for a given set of conditions the unit will work properly.

The use of the throat discharge into the combustion chamber causes the smoke to flatten out and be distributed all across the diameter of the burner housing 21. This insures that as the smoke comes into the housing the smoke from pipe 12 is diffusing and changing in cross section, and this aids in complete combustion of the material comprising the smoke.

The supports 22 of course can be adjustable for ease of installation, and the burner 24 is designed for high capacity with good flame retention characteristics. The material that causes smoke and odor carried in pipe 12 is completely burned so that the output from opening 30 is within the pollution control standards. Secondary air for the burner is taken outside the smoke zone, below the unit, so that it results in complete combustion. The amount of outside secondary air supplied can be adjusted if desired. The controls 26 can include suitable indicator lights for showing that the burner is on or off, and convenient on-off switches can also be remotely located if desired. The burner housing is refractory lined for temperatures up to 2,300°F. so that the burner housing does not break down during the high operating temperatures.

The device is relatively easy to install and control, and makes it possible to use a unit that will meet pollution control standards so that solid wastes can be burned without violating pollution control laws.

The baffle disc can be provided with holes therethrough, if desired as well as having its edges spaced from the walls of the chamber.

What is claimed is:

1. An afterburner pollution control device for burning materials received from a separate incinerator in the form of a smoke mixture, comprising a combustion chamber elongated along a longitudinal axis, an inlet to

said chamber adjacent one end of said chamber and a discharge outlet from the housing spaced from the inlet, a separate burner member adjacent said one end, and positioned on a side of said inlet opposite from the discharge outlet from said chamber, and a baffle means mounted in said chamber and adjustable in longitudinal direction along said chamber to regulate the size of said combustion chamber effectively between the inlet and the outlet thereof.

2. The combination specified in claim 1 and a smoke pipe from said incinerator connected to said inlet, said smoke pipe being round in cross section, and the inlet opening to said chamber being rectangular in cross section, and a transition pipe section between said round pipe and said inlet.

3. The combination specified in claim 1 wherein said chamber is mounted about an upright axis, and said burner and inlet are adjacent the lower inlet of said chamber.

4. The combination specified in claim 2 wherein said chamber is circular in cross section, and said rectangular opening merges into the full diameter of the chamber in diametral direction, and is of less height along the longitudinal axis of said chamber than the diameter of said chamber.

5. The combination specified in claim 4 wherein said burner is a gas burner, and control means for regulating said gas burner.

6. The combination specified in claim 1 wherein said baffle comprises a disc, a rod supporting said disc, and means slidably mounting said rod with respect to said chamber and for releasably fixing said rod in position to permit moving said baffle along the longitudinal axis of said chamber.

7. The combination as specified in claim 1 wherein said baffle comprises a disc like member movable along the longitudinal axis of said chamber and being formed to permit products of combustion to pass said baffle and to be discharged from said chamber.

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