ABSTRACT: A cyclone furnace for an installation for drying and incinerating mud or sludge such as sewer sludge comprises a vertical cylindrical chamber closed at its upper end and extended downwardly by an internal frustoconical wall. The fuel and air for combustion are introduced, optionally with the material to be incinerated, tangentially into the cylindrical chamber. The waste gases are removed by a duct at the lower end of the combustion chamber. The temperature is sufficiently high to enable the ash to drop from the lower end of the combustion chamber in liquid form.
SEWAGE MUD SLUDGE DRYING AND INCINERATING INSTALLATION

The invention relates to sewage mud or sludge drying and incinerating installation, comprising substantially a drier and a cyclone furnace, the latter being used for burning the dried sludge and imparting a high temperature to the fumes, a first circuit conveying the fumes from the drier to the outlet of the cyclone furnace, where they mix with the furnace fumes, a second circuit returning the said mixture to the drier inlet and being of sufficient length, taking into account the temperature of the fume mixture, for the latter to be practically deodorized at the drier inlet, and a third circuit removing part of the deodorized fumes at the drier inlet for expelling them into the atmosphere.

The present invention concerns a particular embodiment of the cyclone furnace for incinerating the dried mud or sludge in an installation according to U.S. application Ser. No. 800,149, filed Feb. 18, 1969, now U.S. Pat. No. 3,521,581.

The cyclone-furnace type of incinerator according to the invention comprises a vertical cylindrical chamber closed at the top part and extended downwardly by a conically shaped portion provided with a central orifice, the fuel and combustion air, and possibly the materials to be incinerated, being introduced tangentially into the cylindrical chamber.

Owing to this construction, the fumes are discharged through the lower orifice and consequently maintain the walls of this orifice at a temperature high enough to facilitate the flow of ash in the liquid state through the said orifice.

The materials to be incinerated may be introduced tangentially, like the combustion air and fuel, or separately through the upper part of the apparatus. Of course, the cyclone furnace, which is to provide intense combustion with a high-combustion temperature is lined internally with refractory concrete and externally with an insulating material.

Such an incinerator is particularly advantageous in an installation according to said application because this simple construction is very suitable for an industrial installation while ensuring safe operation through the flow of ash in the liquid condition. This liquid ash may be collected in a dry device or in cold water, producing rapid cooling favorable to possible granulation of the ash by a crusher placed below the cyclone furnace.

The following additional description, together with the single FIGURE of the drawing, will make it quite clear how the invention may be put into practice.

The drawing shows diagrammatically a vertical section of an incinerator according to the invention coupled to a fume discharge conduit in an installation according to said application, and to a liquid ash recovery tank.

Preferably, the orifice 34 is bounded by a downwardly flared conical surface 35. The furnace may be extended by a downwardly flared conical portion 36 surrounding the orifice 34.

Internally, the furnace is lined with refractory concrete 37 and is covered externally with insulating material 38.

The materials to be incinerated, which are dried mud or sludge, are introduced into the cyclone furnace through one or more nozzles 39, being preferably carried by the combustion air. The nozzles, supplied by the conduit 12 of an installation according to the parent U.S. Pat. No. 3,521,581 are substantially tangential to the furnace wall for imparting a rotational motion to the materials and air. The fuel which may be gas or fuel oil, may also be introduced through the nozzle or nozzles 39 or through a separate nozzle.

Possibly, the materials to be incinerated may be introduced through the top wall 32 of the cyclone, but in that case, the fuel and part at least of the combustion air should be introduced tangentially.

The liquid ash and the fumes escape through the orifice 34 and pass through the chamber 40 bounded by the wall 36 which is also lined with refractory concrete. By the action of the radiation from the walls of the chamber 40 and the circulation of the fumes, the orifice 34 is kept at a high temperature, facilitating the flow of liquid ash. Furthermore, the shape of the orifice 34, particularly the edge 41 at the junction of the conical surfaces 33 and 35, is designed to facilitate the flow of this liquid ash.

The fumes are discharged through the conduit 18 of the installation according to said application, being possibly exhausted by a fan (not shown) for ensuring good circulation inside the apparatus.

The liquid ash is collected, below the furnace, in a device 43, either dry or in cold water, producing rapid cooling for permitting possible granulation of this ash.

Of course, the cyclone-furnace type of incinerator, described more particularly here, may be used not only for sewage mud or sludge but also in a general manner for any residual mud or sludge from chemical or various other industries.

What is claimed is:

1. Apparatus for incinerating dried sludges such as sewage mud or sludge comprising a cyclone furnace having a vertical cylindrical chamber closed at its upper end, an internal frustoconical wall portion connected to the lower end of said cylindrical chamber, said wall portion having a central outlet orifice, inlet means for introducing fuel, combustion air and the sludges to said cylindrical chamber, at least said combustion air being introduced with a substantially tangential component of motion into said combustion chamber, and means for removing both liquefied ash and combustion gases from said cyclone furnace through said orifice.

2. Apparatus according to claim 1, in which said orifice is surrounded by a lower chamber having a frustoconical wall surface.

3. Apparatus according to claim 2, in which said chamber has a downwardly flared frustoconical wall surface.