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(54) **Process and equipment for the treatment of solid urban wastes.**

(57) Process for the treatment of solid urban wastes by means of a grinding in a mill with grinding bodies and separation through grid diaphragms associated with the mill.

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"PROCESS AND EQUIPMENT FOR THE TREATMENT OF SOLID URBAN WASTES"

The present invention relates to the treatment of solid urban wastes and to the relevant equipment; in particular, the present invention is concerned with a process and an equipment suitable for grinding, homogenizing and blending the solid urban wastes.

The solid urban wastes are generally constituted by a mixture of non-homogeneous substances. In particular, they comprise the fermentable organic matter, plastics, paper, metals, lithoidal materials, glasses, and so forth.

For a rational treatment of the wastes, it is therefore necessary to carry out a preliminary sorting of the same wastes, in order to recover those materials which can be recycled (paper, metals, plastics), to carry out the composting in order to recover and exploit the interesting products at an agronomical level, and to incinerate the coarse plastic materials in order to recover heat and produce steam and electrical power.

At present, several steps of treatment of the solid urban wastes are necessary.

In particular, in a first treatment step, the solid wastes undergo a grinding inside hammer mills or inside aerated rotary drums (biostabilizers) wherein the wastes remain for some days; the treated materials are subsequently submitted to sieving steps by means of rotary drum sieves, vibrating sieves, and so forth.

These processes known in the art suffer from some disadvantages deriving from the wear of the hammer grinders, and from the poor efficacy thereof. In fact, on one hand the inert materials, such as the lithoidal materials and glass remain in a coarse form, and must be removed; the plastic materials are ground and are difficult to separate from the fermentable organic matter.

Furthermore, the obtained organic matter has such a particle size, as not to make it possible an efficacious microbial attack to be carried out.

Furthermore, the drawback exists, that the sequence of the steps renders the treatment long and complex.

The present Applicant has found now that the above exposed drawbacks can be overcome by performing both the grinding and the preliminary treatment and sorting of the wastes as one single step.

The process of the present invention is accomplished by using a single equipment, which makes it possible the grinding, the homogenising and the sorting of the solid urban wastes to be carried out as one single step.

The equipment used in the process of treatment of the solid urban wastes according to the

invention is constituted by a rotary drum mill, fitted with a system for the separation of the ground and homogenised materials from the coarse materials, commonly denominated as poor-grindability materials.

According to a form of practical embodiment of the invention, the grinding device is constituted by a cylindrical, horizontal, continuously-operating mill equipped with grinding bodies.

According to a still more preferred form of practical embodiment, the grinding bodies the mill is equipped with, are constituted by bars.

The grinding-body mill acts in a selective way on the biodegradable organic matter, which is finely ground and homogenized, whilst the hard plastic matters are left unchanged and can be easily separated from the biodegradable matter. The fine plastic material is only broken, and also it can be separated from the fermentable organic material. On the other hand, glass, and the lithoidal materials are finely ground and homogenized with the fermentable material.

According to a preferred form of practical embodiment of the present invention, the grinding-body mill is fitted with a system for the continuous separation of the processed materials. In particular, the horizontal-body mill is provided with a wall perpendicular to the revolution axis, which is constituted by a grid which allows the finely ground material (the fermentable organic material), but not the

plastic materials (poor-grindability materials), to pass

through. In front of the side of the grid directed towards the interior of the drum, a diaphragm is provided, which enables all materials submitted to grinding, but not the grinding bodies, to pass through.

According to this preferred form of practical embodiment of the invention, two separate streams of materials continuously come out of the grinding-body mill.

The coarser materials can be submitted to a further sieving, in order to separate the entrained finer materials, in an equipment outside the grinding-body mill.

In the hereto attached, hereinafter discussed figure, a device is depicted, which makes it possible the process according to the invention to be practiced.

In the Figure, by the reference numeral 1 the grinding-body mill is indicated, wherein such a mill has a cylindrical shape, with a base diameter longer than the cylinder height. By the reference numeral 2, the diaphragm is indicated, which makes it

possible the ground material, but not the grinding bodies, to pass through, wherein said grinding bodies can be constituted by cylinders or balls made from a high-hardness metal material. By the reference numeral 3, the grid is indicated, which makes it possible the finely ground material to pass through, with the coarse material being retained. The finely ground material leaves the mill through the duct 4 coaxial with the axis of the mill, **whilst poor-grindability materials flow** through the inner duct 5 to the rotary sieve 6 wherein they are separated from the entrained fine materials, and are discharged through the line 7.

Inside the air gaps between the diaphragm and the grid, and between the grid and the discharge head, baffles are installed, which convey the material towards the axis of the mill and towards the discharge thereof.

By means of such an equipment as shown in figure, treatments were carried out of solid urban wastes, which contained 45% of moisture, and had the following average composition, relatively to the dry matter:

- Paper and cardboard 22%
- Textile materials and wood 5%
- Plastic materials 9%
- Metals 3%
- Inert materials (glass and lithoidal materials) 7%
- Sundry organic materials 36%
- Undersize (20 x 20 mm) 18%

After the grinding of the wastes, amounts of biodegradable, finely ground organic matter can be recovered, which are comprised within the range of from 50 to 60%.

The organic substances recovered and separated from **the poor-grindability materials can be submitted to the biological** processes of composting or of anaerobic digestion.

of revolution constituted by a diaphragm which allows the treated materials, but not the grinding bodies, to pass through, and by a grid which makes it possible the finely ground materials, but not **poor-grindability materials, to be separated.**

5. Device according to claim 3, characterized in that outside the mill and integral with it a revolving grid is installed on the discharge duct, in order to separate the entrained ground materials.

6. Device according to claim 3, characterized in that inside the air gaps between the diaphragm and the grid, and between the grid and the discharge head, baffles are inserted, which convey the material towards the axis of the mill.

Claims

1. Process for treating the solid urban wastes characterized in that the wastes are submitted to grinding inside a mill equipped with grinding-bodies.

2. Process according to claim 1, characterized in that the grinding bodies are constituted by bars.

3. Process for treating the solid urban wastes according to claim 1, characterized in that with the grinding operation the separation of the finely ground materials from the coarse materials is associated.

4. Device for the treatment of the wastes according to the preceding claim, which is constituted by a horizontal mill equipped with grinding bodies, which has one of its walls perpendicular to the axis

