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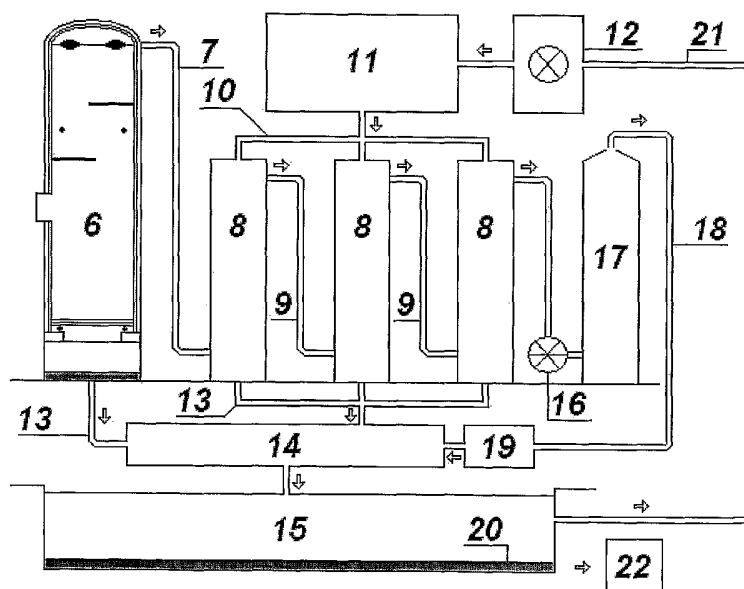
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(54) Title: PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE



(57) Abstract: The present request privilege mentions an installation for mineralization garbage and, more particularly, to the technique for the attainment of you leave nutrients, without that the process after has the necessity of some type of treatment so that the end item, which is a saline mixture, either incorporated to the ground under the rich fertilizer form in you leave minerals. The process if unfolds in two phases: the phase of recycling and the phase of mineralization properly said. It presents as another very important characteristic, the fact of that effluent, gaseous, liquid all its and solid ones, are innocuous and do not generate impacts in the health and the environment.

" PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE "

TECHNICAL FIELD

The present invention patent of thermal oxidation process and
5 chemical treatment for mineralization garbage.

The garbage can be classified in categories, such as: clinicals,
commercial, industrial, agricultural and urban-homes.

The garbage clinical is constituted in general by residues,
produced in clinicals, pharmacies, laboratories, put of health and veterinary
10 clinics, formed mainly by syringes, needles, gloves, gauzes, bandage, organs
and woven removed, films of X-Ray, due medications, finally, whole type of
septic material potentially contagious.

The commercial garbage is originated from establishments as:
banks, offices, supermarkets, stores etc. Its main components are the paper
15 and the plastic, called with packings of the most varied types.

The industrial is the type of more varied garbage, could consist of
ashes to toxicant residues as: acids, fibers, rubbers, metallic scums, glasses
and ceramic. Companies specialized in the purchase of those residues exist, in
which the same ones are recycled, or just separate and sold for another
20 companies.

The agricultural garbage is characterized by coming solid residues
of the agricultural activities. It is constituted basically of herbicide packings,
fertilizers, manures (when in excess), dead animals and products pesticides,
being these last ones the most preoccupying with relationship to the improper
25 reutilization of packings and damages to the middle-atmosphere.

The garbage urban-homes it is originated in the daily life of the
residences. The main representatives are: newspapers, magazines, remains of
victuals, packings in general, plastics, hygienic paper, feminine disposable,

absorbent diapers, electric piles, lamps, finally, material of the people's daily use.

The garbage urban-homes, specifically the organic, is the ideal for the mineralization process, even so the other garbage types can also be mineralized, except for the clinical's garbage, that it should not be recycled, but
5 incinerated completely.

That garbage type doesn't usually receive any type of specific treatment. It is going to great deposits, where it will be left for the decomposition. After that period, it will be terrified and, in that situation, the
10 reactions involved in the fermentation will generate gas and leachate mainly. In some few places, a part of the organic garbage is prepared for the production of natural fertilizers. In those cases, the garbage is left in the embankments to decompose under controlled conditions, producing humus.

The purpose of this and of another processes of treatment of the
15 garbage is the transformation. On one side, the public administrators' concern exists and of the populations in general with the problem of the accumulation of the garbage, mainly the urban, because it occupies great spaces and it degrades the life quality of the close communities to the deposits. On the other hand, the growing interest exists in the recycling of the garbage seeking its
20 economic reutilization.

To the chemical reaction that generates thermal and luminous energy starting from the heating of a substance to high temperatures in middle with excess of oxygen (or air) gives the name thermal oxidation.

The thermal oxidation excludes the processes pyrolytic, that is to
25 say, thermal treatments accomplished in the absence of oxygen.

The recycling processes, incineration and of wash of gases they are already known. Even so, which one wants to patent it is the final process of mineralization of the organic garbage.

BACKGROUND FIELD

In spite of the existence the processes of treatment of urban garbage, that they seek the obtaining of fertilizers, for composition or other processes, for incorporation to the soil, the same ones don't get to present, in its
5 composition, a satisfactory minimum text of enough mineral salts to nurture the vegetable by means of its root. Even so, the only forms known as alternatives to substitute the salts nutrients are: the fertilizers or humus and the residues of it burns, that they are technical of low cost, even so, precarious of the point of view of the nutrition of the vegetable, as described them ahead.

10 Thus, the fertilizer is obtained basically by means of the mixture of organic matters that are good exclusively as vehicle to transport nutritious salts that will nurture the vegetable. The fertilizer production takes place by means of fermentations aerobics and anaerobic of the garbage.

Several processes exist for the treatment of urban garbage,
15 objectifying the fertilizer obtaining for the soil, or, even, of liquid fuel and solid. The process of transforming the garbage by means of the grind of the same and, consequently, its composition so that there is the forced fermentation (anaerobic), it is already of knowledge, in the document BRPI 67.075, where the invention describes the process, for which, it leaves of the treated matter
20 destines to the furfural production and the other to the production of the fertilizer humic, by means of the recycling process and addition of acid phosphoric, happening to the hydrolysis. The accomplishment of that process usually elapses basically of the use of coming garbage of the cellulose.

The document BRPI 61.601 also refers to the transformation of the
25 garbage and homemade debris in fertilizers, by means of the grind of the raw material and composition of the same, in controlled temperature, in contact with a gas oxidizer, being the same fermented naturally (fermentation aerobics).

Another conventional processing of treatment of the urban garbage is that accomplished by means of the calcination of the same, for

obtaining of fuel and fertilizer. In that process, it happens a complete combustion and it burns of the whole matter, transforming the elements and substances in burns' residual products, denominated basic oxides.

The document US 5.313.894 describes an invention, for which the
5 garbage is burned partially in reduced atmosphere, or non oxidizer, where a part of the matter becomes fuel and the other breaks it transforms in basic oxides. That process is accomplished by means of an incineration structure, as it describes it referred document.

The document BRPI 8108660, for its time, describes a device and
10 a process of treatment of the homemade garbage, for the dehydration of the organic matter and of the urban residues, by means of the compression of the same and posterior it burns of the material dehydrated by the liberation of the combustible gases and obtaining of the coke in form of ingots.

On the other hand, the equipment described in the document of
15 the German patent 4239305 AL also accomplishes a process of it burns of the urban garbage for formation of nutritious residues, with objective for fertilization of vegetables.

In spite of it burns it partially or total of the garbage, that those
onerous equipments with its respective processes execute, problems of
20 ecological order still appear, since none of them treats the gaseous effluents, current of the it burns, before they be thrown in the atmosphere, under the form of gases and vapors, could cause several types of ecological damages to the middle-atmosphere.

As used in this report, the reference to the term " nutrients " should
25 be understood as meaning any salts, such as: nitrates, phosphates, sulphates, carbonates, chloride etc., capable to nurture the vegetable through its absorption for the structure of the same. Besides, the term "basic", alkaline "oxides" or " ashes " will be used as synonym of resulting residue of the incineration of the organic matter.

The incineration method the most efficient was already considered to eliminate the garbage, be him of domestic, industrial origin or clinical. However, with the progress of the industrialization, the nature of the garbage started to suffer drastic changes. The production in mass of chemical and plastic products turns, nowadays, the elimination through burns by incineration, a complex process, of high cost and highly pollutant.

Basing on the faith that " burns it he/she makes the garbage to disappear ", the incineration emerged thoroughly as a process used to destroy the toxicant garbage generated by industries, residences, hospitals etc. Even so, far away from doing the garbage to disappear, nowadays, the incineration still generates more toxicant residues, becoming a significant menace for the public health and the atmosphere.

The incineration is proposed as an alternative, so much for sanitary embankments of domestic garbage as for industrial embankments for inert or toxicant residues. All the embankment types present limited time of useful life, besides the maintenance cost. In the case of special embankments for toxicant residues, the costs are still higher, due to the risks of contamination that the industrial embankment should avoid.

However, the incineration of residues generates gaseous and ash emissions contaminated entirely with heavy metals, chemical products of incomplete combustion and chemical compositions new, formed during the process of it burns. Besides the contamination of the air, the ashes are generally taken for embankments, with variable levels of safety, or worse, they are simply thrown in the middle-atmosphere without the smallest care.

Therefore, with the incineration, the industry found a way to decrease the volume of the garbage and to release it for the middle-atmosphere by means of emissions for the air, for the water and the disposition in the soil of those polluted ashes. Thus, the incineration comes as it is, in fact: a convenient

way for exempt of the responsibility, for which the industry chews the current problem of the garbage and transfers it for the future generations.

Among the environmental impacts of the process of incineration of the garbage, the most harmful are the toxicant emissions. Data that show exist
5 that it burns it of garbage, same when accomplished in the most modern incinerators, it is risky, because, of the it burns it will result the liberation of three types of dangerous pollutant for the middle-atmosphere: the heavy metals, the products of incomplete combustion and chemical substances entirely new formed during the incineration process.

10 The heavy metals are not destroyed during the incineration, being frequently liberated for the middle-atmosphere in forms until more concentrated and dangerous than in the original garbage. The combustion in high temperature liberates more toxicant metals, as the lead, the cadmium, the arsenic, the mercury and the chromium, even in if being about the incineration
15 of stable materials as the plastics. They are liberated in the form of minuscule particles or gases, increasing the risk to the health for the inhalation of those polluting substances.

A commercial incinerator of medium size, capable to burn 32.000 tons of garbage a year of industrial residues, it can emit metals weighed for the
20 air in a rate of approximately 92 tons a year, even if the residue just contains medium amounts of metals. Other 304 tons a year of metals they will be incorporate in ashes and residual liquids. Equipments of pollution control can remove some types of metals of the emissions, but nor everybody the heavy metals can be eliminated with safety of the gases of the chimneys.
25 Nevertheless, the metals don't disappear completely, because they are transferred merely of the air for the ashes, or for the filters, which end, later on, terrified.

With relationship to the combustion degree, no incineration process operates with 100% of effectiveness. Present chemical substances in

the industrial or domestic residue can stop being totally burned and they end being liberated in the form of gases. Those products also escape for the air as fugitive emissions during the storage, manipulation and transport of the industrial residues or of the ashes. Instead of the incinerators they destroy the garbage, they also generate toxicant materials, in the form of ashes and in the effluents of equipments of wash of gases and/or processes of refrigeration. The ashes of incinerators carry many of the same pollutant that are emitted in the chimney gases. Studies identified 43 products chemical organic different little volatile in the ashes of incinerators and at least 106 organic chemical products in the water of wash of the gases of incinerators of dangerous garbage. The ashes are usually arranged in embankments, while the effluents are frequently negotiated before they be emptied in rivers and lakes.

Besides the problems already mentioned, one of the most treacherous aspects of the incineration is totally the generation of chemical products new and highly toxicant that can be formed during the combustion process. When chemical fragments of garbage partially burned if recombining in the oven of the incinerators, smoke's chimneys and/or devices pollutant controllers, hundreds and even thousands of new substances are created, and, many of the which, they are more toxicant than the components of the original garbage. Of the thousands of new pollutant that they can be formed, approximately 100 of them were already totally identified. Among them they are the dioxines and furanos, frequently just mentioned as dioxines, a class of chemical compositions thoroughly known as being already the more toxicant chemical products created by the man.

The dioxines is generated when materials, contends chlorine, they are burned. They don't present commercial use and they are associated to an extensive spectrum of harmful effects to the health, such as: development of sexual alterations, masculine and feminine reproductive problems, suppression

of the system immunological, diabetes, organic noxiousness, besides a wide range of effects on the hormones.

Once emitted in the middle-atmosphere, the dioxines can travel long distances in the air and in the oceanic currents, promoting a global contamination. In 1997, the International Agency of research of Cancer (IARC) it classified the most toxicant dioxines as being cancerous for the human beings. The dioxines is liberated in the middle-atmosphere by means of gases of chimneys of the incinerators, in flying " ashes " or soots, and in the effluents of devices pollution controllers. Researches suggest that resident people in United States and in some European countries, nowadays, they carry dioxines and furanos in its body, in very high levels, getting to reach a concentration level where the harmful effects to the health human undoubtedly happen, until could be lethal.

The liberations of dioxines of the incinerators cannot easily also to accumulate in ruminant animals and in fish, through the alimentary chain. They can be mentioned as examples of harmful effects the following cases:

- In 1989, sixteen proprietors of farms of cattle of milk, placed in areas that met in the line of the winds of the chimney of the incinerator of Rotterdam, Holland, was forbidden of selling milk of its flocks, because the milk introduced dioxines levels higher than allowed three times him in that country.
- In January of 1998, they were shut three incinerators in Lille, France, because the production of milk in lands located in the line of the winds of the chimneys of those incinerators was polluted with dioxines levels higher three times than the values allowed for commercialization.
- Residents of a property located in the line of the winds of the chimney of the incinerator model of the city of Pontypool, to the

south of the Country of Wales, they were noticed to avoid to consume ducks or chicken eggs originating from of its property.

Besides the problems already mentioned, it can happen the accidental liberation of residues, when chemical products are removed of storage recipients in the patios of the incinerators, or when embarked in transport vehicles to be correspondents for incineration. A medium incinerator, capable to burn about 32.000 tons of garbage a year, it will receive more than 1.500 dump trucks with garbage shipment a year, or more than 28 trucks a week. In agreement with EPA of United States, involuntary " discharges and accidental spills can liberate so much as or more toxicant material for the middle-atmosphere than direct emissions of the incomplete incineration...". it still Exists the risk of liberations of toxicant material in catastrophic proportions, caused by fires and explosions.

In complementation to everything that it was presented, fits to point out that the incineration ashes can be extremely toxicant, contend a high lead concentration and cadmium, as well as dioxines and furanos. As better the device of pollution control in the chimney of the incinerator, adult will be the concentration of present pollutants in the ashes. The final destination of the toxicant ashes, of safe form and correct environmentally is expensive and problematic. With an adapted handling of the ashes, the cost is impracticable, turning the incineration economically a process unviable. Handling in an inadequate way, the ashes represent risks for the health and for the middle-atmosphere, in the short and in the long periods. The cost average esteemed at the area center-west of United States to dispose a ton of dangerous garbage is of US\$ 210,00, compared at the cost of US\$ 23,00 for the common garbage. Some specialists recommend to deposit those ashes in embankments covered with a coating of common plastic, as form of preventing lixiviation for the water table. Even so, all the coatings facts in embankments eventually can suffer leak.

At the end of this analysis on the harmful aspects of the processes common of garbage incineration, a more specific observation fits on the potential damages to the human health and the middle-atmosphere.

An increase of the rates of cancer incidence, of breathing
5 diseases, of reproductive anomalies and other effects about the health has been noticed among people that live garbage incinerators close to, according to the results of scientific researches, local community and physical risings. Problems as: cancer, bad fetal formation, reproductive dysfunctions, neurological damages and other effects about the health can also happen, even
10 in cases of exhibitions to low levels of metals heavy, composed organochlorines and other pollutant liberated by incinerators.

It was proven that many pollutant liberated in the air for the it burns industrial of garbage, they accumulate about the plantations and they are ingested in our feeding, especially the green vegetables, fruits and vegetables,
15 in that the eatable parts are exposed, as the lettuce, the apple and the tomato. The meticulous wash of the victuals can remove a portion of the pollutants of the surface of the vegetables. However, a significant portion (from 15% to 50%) it will still stay impregnated.

20

STATE OF THE TECHNIQUE

Given the enormous problem generated by the processes of garbage incineration, some entities believe that measures should be taken to interrupt its use immediately. Instead of restricting the norms and patterns of control of environmental pollution, the national governments should implement
25 the following politics;

- A moratorium in the construction of new incinerators of garbage and/or in the amplification of the already existent, for the risk aspects already presented.

- A fast program for deactivation of all the existent incinerators.
- Development of production programs cleans, with the objective of if they eliminate processes, products and toxicant residues.

A correct way for the reutilization of the garbage is still the
5 selective collection, that it depends on specialized entities that instruct the population, distribute appropriate recipients so that each individual, in its residence, separate the garbage in the main categories: glass, paper, plastic, metals and organic garbage.

In some cities, the own Municipal City hall takes charge of that
10 work, obtaining the relative financial return to the material that is reused.

In some " big garbage ", the system of wakes carriers is used, in which the pickers removes manually what is profitable. That represents a better degree of use in relation to the " big garbage " where it just gathers the garbage, which is spread later by heavy tractors.

15 To the organic material the composition process, biological process of decomposition of the organic matter, can be applied where the final product can be taken advantage of as organic fertilizer. In that process, the organic fractions are taken to patios and disposed in piles of varied sizes, that they are frequently revolved, with aid of tractors, shovels or automatic
20 removers, during a medium period of 4 to 6 months. The process can be accelerated pipes perforated for aeration under the piles being used.

The construction of sanitary embankments is a technique of disposition of urban solid residues in the soil, minimizing the environmental impacts and risks to the public health. In that process a located pollution is had,
25 where the residues are confined in cameras covered with inert material (usually the own soil). In the embankment, the soil should totally be compacted in the base of the embankment, what turns it impermeable avoiding, like this, the penetration of the leachate for the water table. It reminds that leachate is the term used to refer to the coming cloudy dark liquid of the storage and rest of the

garbage. Its chemical composition is variable, depending a lot on the type of garbage deposit.

This way, the state of the technique was presented. The next item shows a brief description of the patent present.

5

SUMMARIZED DESCRIPTION OF THE INVENTION

As it was seen, the processes of transformation of the garbage for incineration bring inconveniences, such as: harmful impacts on the health and the middle-atmosphere, the hygiene lack and the little practically.

10

In view of that, it intends the employment industry with application of mineralization process for the treatment and final destination of the urban garbage. The processed it unfolds in two phases: the recycling phase and the mineralization phase properly said.

The present privilege request, therefore, refers to the installation for mineralization of the garbage and, more particularly, to the technique for the obtaining of nutritious salts, without there is the need of some treatment type after the process so that the final product, which is a saline mixture, be incorporated to the soil under the form of rich fertilizer in mineral salts.

20

Other characteristics notables of the proposed process aim that he doesn't request great areas for storage of the garbage or of composed organic and it doesn't produce harmful effluents to the human health or the middle-atmosphere.

25

DESCRIPTION OF THE DRAWINGS

The Illustration 1 illustrates, in a schematic way and without scale, the phase of recycling of the process here proposed, from the discharge of the

dump truck collector to the entrance of the organic material inside of the oven incinerator.

The Illustration 2 illustrates, also in a schematic way and without scale, the process of mineralization of the garbage, starting from the incineration until the exit of the products. The arrows indicate the sense of the flow of the process.

The Illustration 3 illustrates the representative diagram of blocks of the flow of the several substances involved in the process, breaking of the garbage, showing all the intermediary by-products and the final products. For convention, the square elements of the illustration represent the intermediary compositions, the rectangular elements represent the final products and the circular elements represent the stages of the process.

DISCLOSURE OF INVENTION

The carbon is a fundamental chemical element for survival of the vegetables. That element is absorbed by them, or by means of the photosynthesis process, or for the rootses of the plants by means of the decomposition microbiological accomplished by humus, or then, in the residues of the it burns of organic matter, where there is formation of nutrients and, finally, by means of the nutritious salts dissolved in the water and absorbed by the rootses of the plants.

The privilege request here proposed it uses a new technique and improved for the mineralization of the garbage, that already overcomes the problems pointed, caused by the incineration, transforming all the organic residues in rich mineral, nutritious salts in nitrogen, match and potassium, that can be immediately incorporated to the soil without treatment or posterior benefit.

In the preparatory phase of the process object of the present privilege request, the garbage, properly transported by trucks collectors, it is drained in appropriate place or directly in a drum turn over. That drum turn over disaggregate the garbage, tearing the plastic sacks and disaggregating compacted garbage clods and it doses the resulting mass in layers, in appropriate way to the selection. Soon after, the garbage is distributed evenly by the whole surface of a take wake, to facilitate the screen. That wake transports the garbage disaggregating through the take positions, facilitating, in a hygienic way and it holds, the selection and the retreat manual of the materials recycled.

The amount of material recyclable, for an industry of any capacity represents, on the average, about 20% of the weight, and he/she enters those materials you recycled they are included:

- Plastics, bottles, sacks, bags, packings of PET, PVC etc.;
- Papers, cardboard, newspapers etc.;
- Metallic, as: cans of vegetable oil, packings of aluminum, iron, copper etc.;
- Glasses: bottles, windows glasses, glasses white and dark, lamps etc.;
- Footwears: shoes, tennis etc.

The leftovers after the recycling (about 80% in form of organic material) they are guided to the mill crusher, that breaks into fragments the organic garbage, with the purpose of reducing its granulometry to improve the mineralization process and to obtain high revenue due to the bass potency consumption. The grind operation, when made correctly, it guarantees the accomplishment of the process here proposed, therefore, when the garbage mass presents a correct granulometry, it is obtained better revenue of the mineralization.

Next, another rising crawler transports the organic residues triturated for a gutter, according to a certain ascending angle, introducing that material inside of an oven incinerator through a tilt-up door placed to the medium height of the same. That oven, before receiving the mass of triturated
5 garbage, is preheat to a temperature of about 1.000 °C.

After the preparatory phase, the transformation phase begins. With the material inside of the oven incinerator, has beginning the mineralization process, with temperature controlled among 1.100 °C and 1.200 °C, that it is the strip of ideal temperature to obtain the mineralization of the
10 organic garbage.

The smoke generated by that burns it is captured by a tubing installed in the superior part of the oven incinerator. The gases, vapors and particles in suspension, coming of the incineration they are guided for a sequence of washing tanks, for forced exhaustion, of bass upward. At the same
15 time, for the superior part of the washing tanks, water alkaline is introduced under pressure. This water, in contact with the sheets of turbines is spread in the interior under atomized form.

An against-flow is produced, inside of the washing tanks, for the encounter of the gases and vapors in ascending movement with the showers of
20 vapor of water alkaline, in descending movement, happening, of that encounter a wash that, actually it is a chemical reaction, for the combination of the oxides with acid characteristics, presents in the smoke, with the water alkaline, resulting in the formation of acid oxidizers in liquid solution. The wash is characterized by the retention of those acid oxidizers by the water.

25 The coming liquid effluent of the wash of the gases and vapors of the burns leaves for the inferior part of the washing tanks and it is addressed for an equalization tank. The ashes are also correspondents for the equalization tank, where the pH of the mixture will be controlled through equipments and specific software, resulting like this in new chemical reactions, that result in the

formation of salts. After the equalization of the mixture in the equalization tank, the mixture is a correspondent for decantation tanks.

The coming residues of the tank of healthy decantation guided for filters press or drying beds, where the final product is had, under the form of saline material. Those salts are component natural of the soil and they can be incorporate to the same without risk of contaminating the middle-atmosphere. After an analysis physical-chemistry of that saline material, which is rich in nutritious elements as: nitrogen, match and potassium, the product can be guided for the use of third, for agricultural use.

They fit, in this point, some considerations about the chemical reactions that happen during the mineralization process.

The main of them is that composed organochlorines doesn't exist in the effluents of the same. That is due to the high temperature of the oven incinerator, that, as it was said, it varies between 1.100 and 1.200 °C, being controlled by thermal relay, always staying excess of oxygen during it burns it, besides a constant and permanent whirlwind inside the oven. In those temperature conditions and in the appropriate time, all and any organic matter will be degraded to the state of oxides. As device of safety, a camera of it powder-burns, located soon below the tubes of exit of gases and vapor of water guarantees the incineration of residues of organic matter that eventually escape from the first camera.

Those acid oxides (gases and vapors) components of the smoke, in the process for now proposed, they are caught a cold abruptly (for thermal shock), being used vapor of water alkaline ($\text{pH} > 7$). If they didn't go him, they could be rearranged, creating the compositions organochlorines or furanos and dioxines.

The composed organochlorines is typical products of the raw material incineration in chlorine as, for example, the polivinila chloride (PVC). So, it becomes necessary the refreshing for thermal shock in alkaline

atmosphere ($\text{pH} > 7$). In an alkaline atmosphere the bridge of acid hydrogen disappears, because the hydrogen will link to the oxygen and you put (R), forming radical hydroxyl (HO-R). THE acid chlorine also stops existing, prevailing the saline radical chlorine (Cl-R). THE own carbon won't have
5 conditions nor time of calling to other carbon (C-C) because, in a little alkaline, the CO_2 will react as acid, producing carbonates and molecules of water. Identical reactions will happen with the other oxides acid of sulfur, match, nitrogen etc., the ones which, in presence of water alkaline, they will produce reactions of the type:

10 Acid + base + $\text{H}_2\text{O}(\text{pH} > 7)$ = salt + water.

In the oven incinerator blowers of air exists to guarantee an excess of oxygen and a perfect incineration (oxidation) of the organic matter. Those blowers are installed in such a way that the flow of air tangency the internal walls of the oven incinerator, provoking the whirlwind of the gases mass
15 and coming vapors of the it burns. That whirlwind provokes a larger mixture degree and contact among the reagents molecules, besides increasing the time of permanence of the gases and vapors of the combustion inside the oven incinerator. With that, they are observed 3 " Ts " of the perfect incineration: temperature, whirlwind and time of residence.

20 The solution of the wash is broken by vacuum and mechanical process, almost arriving to the state of vapor to cold, taking like this, the solute alkaline reagent to a perfect one and it completes reaction with the gases and vapors originating from of the incineration. That is due to the mentioned fact that the mass of gases and vapors heated up in the incineration are forced, by
25 means of exhaustion, in against-flow, to pass for showers of water wash alkaline.

After the industry to enter in operational regime, the correction of the pH of the reservoirs of provisioning of the process, it will be done by pH

controllers inserted in the reservoirs, that they will be controlled by specific software, always maintaining the internal atmosphere alkaline.

In the conditions above described, it is impossible the formation of compositions organochlorines, furanos and dioxines in the effluents of the mineralization of the urban garbage.

With relationship to the quality of the effluents, it can be affirmed that the mineralization process here proposed it allows the reduction of the volume of the garbage in a substantial way, of the order from 95 to 97%, thanks to the cash controls of it burns to high temperatures and of the selection of the materials to incinerate, in way, on one side, to avoid the furanos formation and dioxines and, of other, to guarantee a good quality of the produced fertilizers.

Those organic fertilizers, originated of the process here proposed, they are composed by four types of products:

- The ashes or residues of the furnace come inert and with alkaline pH, finding wide use as organic fertilizer.
- The ashes dragged by the combustion gases have reaction with the wash water, which contains acid oxidizers, being formed mineral salts.
- The generated gases are composed basically by nitrogen, dioxines of carbon, sulfur and vapor of water. being Adopted an excess of air of about 30%, a relationship of 10,31 m³ of combustion gases is generated by kilogram of burned garbage, what picks the dilution of the combustion gases on the own nitrogen of the used air.
- After the contact of the combustion gases with the water of refrigeration, condensation and absorption, result of the wash, happens him it drags of solid particles with some components of the mass of the gases that, in contact with the coming ashes of the incinerator, in the equalization tank, it provokes the formation salts.

In view of the presented argument, they stand out the main advantages of this patent object:

- With the mineralization of the garbage, conditions are created for the immediate incorporation of the same to the soil, transforming the garbage in nutritious salts, that is to say, fertilizers, which have properties correctives of pH of the soil, substituting economically in that task, the calcareous.
- They are eliminated the "big garbage ", sanitary embankments, composition areas, leachate and its unpleasant consequences, as the bad smell. Besides, a great area is not requested (that is rare in the great cities) for storage of the garbage.
- It reduces the initial volume of the garbage drastically. After its processing, it can be arrived to a final volume among 3 and 5% of the initial.
- It promotes the disinfection of the middle-atmosphere, reducing risks of contamination of the population for microorganisms pathogenics or for heavy metals, since it doesn't reach water table, the soil or the atmosphere.
- Better economic use of the nutritious salts originating from of the process.
- Thanks to the rigorous control in the formation of coming gases of the it burns of the organic matter, the proposed process guarantees the absence of acid chloride and, consequently, it eliminates the risks of the presence of compositions organochlorines in the washed gases.
- When compared to the organic composition, the mineralized garbage brings advantages, as: for the fact of not being fermented, it is not polluted; it can be incorporated immediately to the soil and it doesn't request posterior correction of acidity degree; the nutrients are concentrated, while, in the organic composition, they are diluted.
- Of the social point of view, an industry of mineralization of the garbage also brings more advantages on the industry of garbage composition,

because it generates more employments, not only for technical personnel, as well as for recycle, eliminated pickers of garbage of the streets and of the "big garbage".

As it was said, the Illustration 1 illustrates, in a schematic way the flow of the process that intends to patent, in its recycling phase. The garbage, collected by a dump truck (1) it is transferred, for gravity, for the drum turn over (2), that disaggregate the garbage, doses and it feeds the recycling process, addressing the material for the catch wake (3), from where the materials recycled they are selected and removed manually. When already reaching the extremity of that wake, the material, under the form of organic garbage, it drops, for gravity, inside of a mill crusher (4), that it breaks into fragments the material, adapting its granulometry. The triturated material drops on a rise wake (5) that transports the material until an opening in the oven incinerator (6).

The Illustration 2 illustrates, also in schematic way, the phase of process mineralization. The material is burned inside of the oven incinerator (6) to a temperature between 1.100 and 1.200 °C. The produced ashes are deposited in the inferior part of the same oven and the smoke is captured by the tubing of collection of gases (7), installed in the superior part of the same oven and it is addressed for the inferior part of a battery of washing tanks (8), that communicate by means of exit tubes of washed gases (9). In the superior part of the statements washing tanks the tubing of water alkaline entrance is installed (10), coming of the reservoir of water alkaline (11). Of the chemical reactions happened inside of the washing tanks, two groups of components are produced: one, of acid oxidizers, in liquid solution, that are loaded for her by means of the tubing of exit of residues (13) leaves for the inferior part of the washing tanks and it is addressed for an equalization tank (14) and that whole material is thrown in an or more decantation tanks (15); the lightest fraction of the reactions happened in the washing tanks, composed of gases and vapors is pumped by an exhauster (16) leaves for a chimney (17), being collected by a

tubing of escape gases (18) and, after passing for refreshing towers, condensers and filters (19) it is also thrown to the equalization tank (14). In the decantation tanks, after the decantation of the mineral salts (20), the water is drained through the tubing of return of the liquid (21) and, after passing for an
5 arrested filter (12) and with the controlled pH, it comes back for the reservoir of water alkaline (11). The deposited mineral salts (20) they are retired, already under the form of mineral fertilizer (22).

The Illustration 3 exhibition, in blocks of diagram form, the total flow of process, with its stages, intermediary components and final products.

10 The garbage (23), collected by the dump truck (1) it is thrown in the drum turn over (2) and distributed on the catch wake (3), from where, after having selected, they are manually retired the materials you recycled (24). Starting from there, the material is prepared for the mineralization phase, going by the mill crusher (4) and, by means of the rise wake (5) it is introduced, in the
15 granulated organic garbage form (25) in an opening of the oven incinerator (6). Of burns, they result the heavy fraction, in the form of ashes (26) composed by alkaline oxides that are driven for the equalization tank (14) and they will become bases or hydroxide (28), and the light fraction, in the form of smoke (27) that contains acid oxides and solid particles in suspension. That smoke,
20 captured by the tubing of collection of gases (7), after passing for the washing tanks (8) and to collide with the coming water of the reservoir of alkaline water (11), leaving for the tubes (9), exhauster (16) and chimney (17), tubing of escape gases (18) and going by refreshing towers, condensers and filters (19), in that, under the form of acid oxidizers (29) they are thrown to the equalization
25 tank (14). In contact with the bases or hydroxide (28) it happens the neutralization reaction, with the decantation of the mineral salts in the decantation tank (15) and the production of water alkaline (30). Then we have, as final product the mineral fertilizer (22).

CLAIMS

1) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, characterized for the fact of that the garbage
5 (23), after to pass for the turn over drum (2) is distributed on the catch mat (3) for election and manual withdrawal of materials you recycle (24).

2) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claim 1, characterized for the fact of that, after the withdrawal of the materials you
10 recycle (24), the remaining material is submitted to the crusher mill (4), producing organic the garbage granulated (25), that it is directed, for the rising mat (5) to oven incinerator (6).

3) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claim 2,
15 characterized for transforming granulated organic garbage (25) for burning into an oven incinerator (6), being the light fraction of the said burning directed for a tubing of collection of gases (7) for the inferior part of a series of washing tanks (8), fed by water alkaline through tubing of entrance (10) proceeding from the alkaline water reservoir (11), being that the light product of the washing of the
20 gases leaves for the superior part of the said tanks through ducts of exit of washed gases (9) that, for the vacuum servant for exhaust fan (16) they leave for the chimney (17), are collected by the tubing of exhaust gases (18), they pass for the towers of cooling, condensers and filters (19) and are launched in a tank of equalization (14), being still that, the weighed fractions more of the said
25 washing of the gases leaves for the inferior part of the washing tanks (8) and are directed for the tank of equalization (14) for the tubing of exit of residues (13), that it leads the material for the decantation swimming pool (15).

4) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claim 3,

characterized for the fact of that, in the equalization tank (14) occurs a neutralization reaction enters basic substances brought by the tubing of exit of residues (13) and acid substances proceeding from the towers of cooling, condensers and filters (19).

5 5) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claims 3 and 4, characterized for the fact of that, the said reaction of neutralization, they result: alkaline water that is removed of the decantation tank through the tubing of return liquid (21) e, after to pass for the filter presses (12), it returns to the
10 alkaline water reservoir (11), and you leave them minerals (20), that they decant in the said swimming pool.

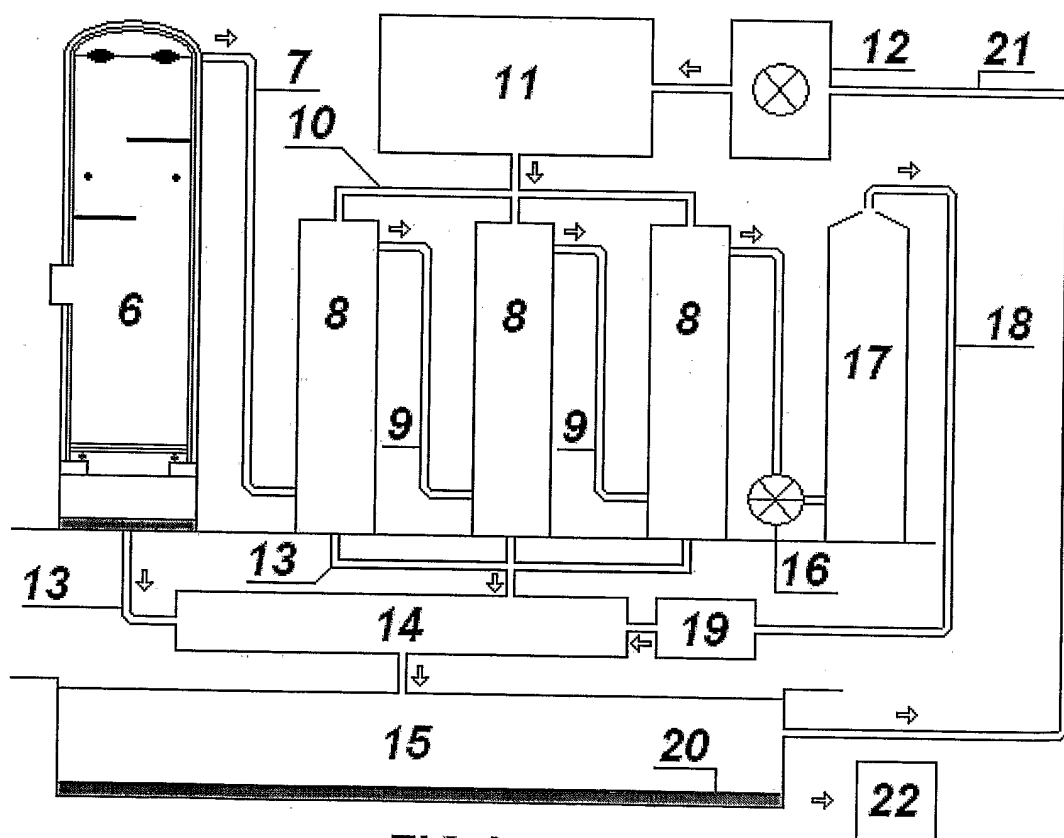
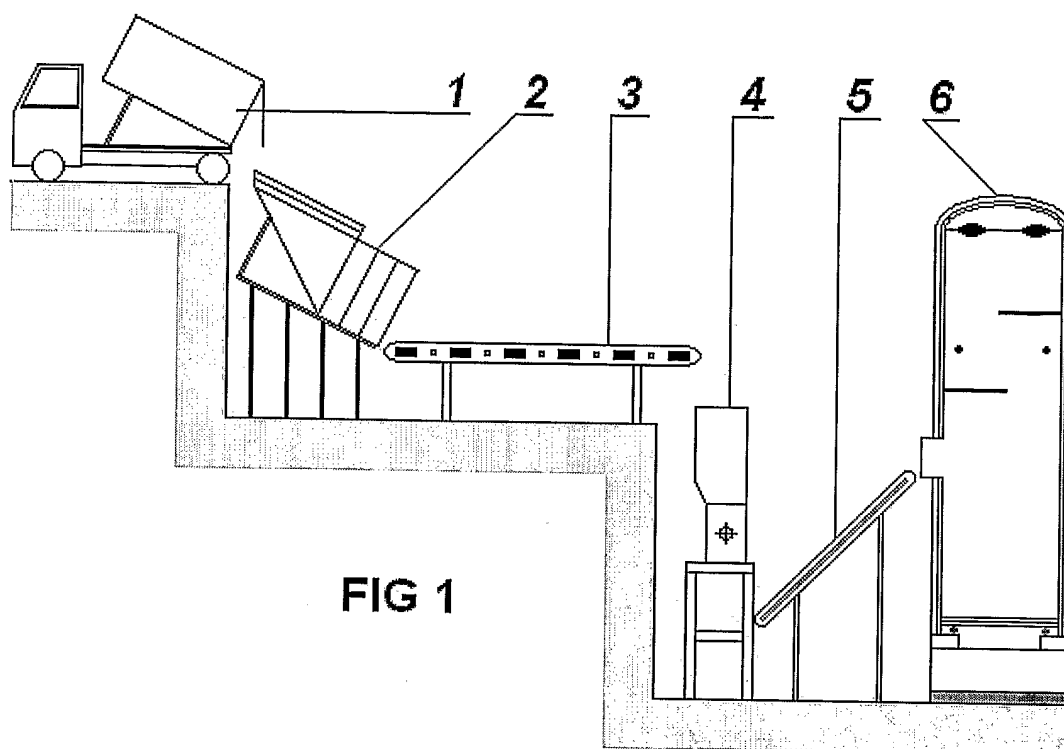
 6) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claims 3, 4 and 5, characterized by the fact that you leave them minerals (20) are
15 fertilizing minerals (22) that they can immediately be incorporated the ground in agricultural applications.

 7) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claims 3 and 4, characterized for the fact of that, being a closed process, it does not
20 have emission of effluent harmful to the health and/or the environment.

 8) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claims 3 and 4, characterized for the fact of that all the generated intermediate composites in the process are neutralized chemically, inside of the proper
25 process.

 9) PROCESS OF THERMAL OXIDATION AND CHEMICAL TREATMENT FOR MINERALIZATION GARBAGE, in accordance with claim 3, characterized for the fact of that the washing of the gases in the interior of the washing tanks (8) if makes in reverse flow, where the gases and vapors

proceeding from the burning and ascendants are shocked with the alkaline water proceeding from the reservoir (11) and pulverized.



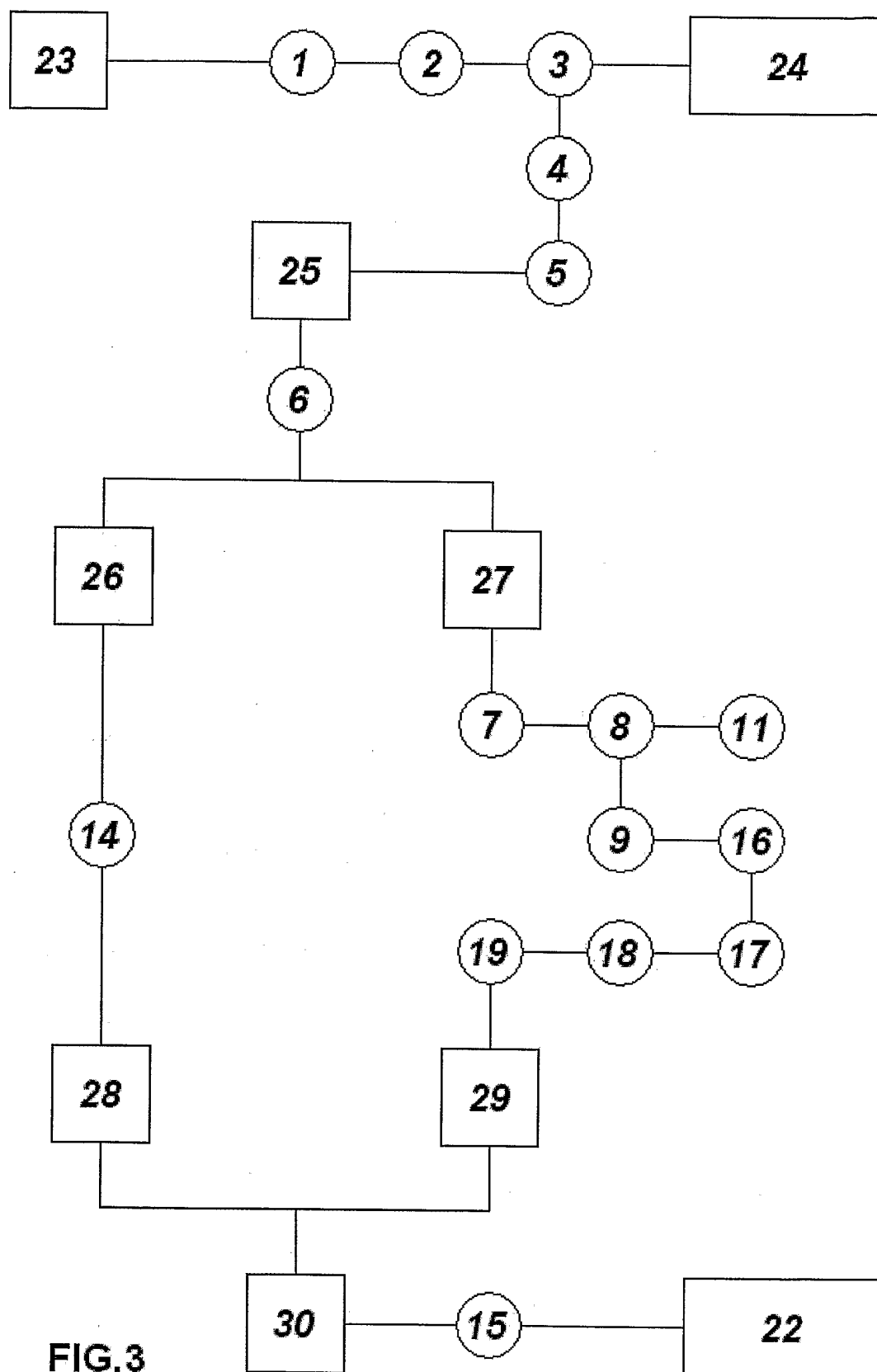


FIG.3