

01-92136 131

Tunja, 11 de Septiembre de 2007

SIC-011

Doctora

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Jefe División Nuevas Creaciones

Superintendencia de Industria y Comercio

Bogota

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 01-092136- -00007-0000

Fecha: 2007-09-11 08:47:33 Dep. 2020 NUECREACIONI
Tra. 2 PATENTES Eve: 1 REGDEPOSITO
Act. 444 RESPUESTAREQUE Folios: 5

Asunto: Respuesta al Oficio 7459 del 21 de junio de 2007

Radicación 01-92136

Tramite 002

Evento 001

Actuación 430

Oficio 7459

Cordial saludo, de acuerdo al OFICIO No. 7459 del 21 de junio de 2007, doy respuesta a las solicitudes que el mismo hace de acuerdo con el articulo 28 de la Decisión 486.

Agradezco la atención prestada.

Atentamente,


German Viasus Tibamoso

cc. 7 162.888 de Tunja

Dirección: Calle 20 No. 6-64 Tunja

Cel. 3118596137

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De acuerdo con la solicitud en el Oficio No. 7459

"Las reivindicaciones 1 a 6 reclaman un proceso de obtención de abono a partir de residuos orgánicos, sin embargo ninguna de ellas define el proceso apropiadamente".

Estas son las correcciones para conocimiento de la SIC:

CAPITULO REVINDICATORIO

1. Un proceso para la transformación de residuos orgánico en abono que comprende las etapas de:
 - a. Alistamiento del material –residuos orgánicos-, implica que deben triturarse para que puedan ser posteriormente consumidos por las larvas de escarabajo. *de skels*
 - b. Disposición de los residuos orgánicos triturados en camas, técnicamente las camas se arman colocando un plástico como base para evitar arrastre por lluvias, las capas de residuos Orgánicos no sobrepasan una altura de treinta centímetros con el fin de evitar procesos de compostación de los mismos es decir con esta altura las camas no presentan elevadas temperaturas para que se sucedan las fases típicas de un compostaje. *¿tácito?*
 - c. Las camas son inoculadas con cepas biológicas que provienen de la investigación preliminar y se denominan así por parte del autor que invento la metodología, estas cepas contienen al igual que el bioabono nutrientes como elementos mayores y menores, es necesario inocular hasta un kilo de cepa biológica por cada tonelada de residuos orgánicos en proceso de transformación. *¿cuales cepas biológicas que producen N.II*
 - d. Cubrir camas con sustrato estabilizado el cual se caracteriza técnicamente por ser un abono grueso que se obtiene de sacar el abono fino para comercialización, este sustrato estabilizado permite que no hayan vectores en el proceso y reduce el impacto ambiental que los residuos orgánicos pueden generar. *? ¿ques abono grueso que se obtiene como se obtiene?*

e. Demás tratamientos que se efectúen al sustrato, este sustrato es un subproducto del proceso general por tanto no requiere ningún tipo de tratamiento adicional.

quitar
espa
dapa

f. Siembra de plantas en la parte superior de la cama, estas plantas aromáticas sirven para generar un ambiente agradable dentro de la planta de proceso de los residuos orgánicos.

después
de siembra?

g. Colocación de larvas de escarabajo, esta se hace una vez se ha tapado la cama con el sustrato, se usan hasta 420 larvas de escarabajo. (vale?)

h. Las larvas de escarabajo consumen los residuos orgánicos durante seis meses al cabo de los cuales se procede a cosechar el bioabono.

i. Se obtiene el producto bioabono y larvas de escarabajo para hacer harina.

2. El proceso de 1, donde el alistamiento del material a. son obtenidos de la siguiente manera: en bolsas plásticas son recolectados específicamente residuos de origen orgánico, todos aptos para tritución, se separan las bolsas plásticas y se procede a triturarlos.

obvio.

3. El proceso de 1, donde las camas son inoculadas con cepas c. Estas se obtiene de la siguiente manera, al cosechar bioabono es necesario usar una zaranda de diámetro 5 milímetros, el material que pasa la zaranda es bioabono y el material dentro de la zaranda se denomina cepa biológica, es bioabono más grueso.

Esto
no es
una cepa
biológica

4. El proceso de 1, donde cubrir camas con sustrato estabilizado d. El sustrato estabilizado se define como un aislante para que las larvas no sean molestadas durante el tiempo que hacen su trabajo de transformación de los residuos orgánicos.

comparar
del sustrato
estabilizado.

5. El proceso 1, donde las larvas de escarabajo consumen los residuos orgánicos h. Las larvas consumen los residuos para continuar su metamorfosis y ser un escarabajo adulto,

6. El proceso de 1, donde se obtiene el producto bioabono i. El producto aprovechado bioabono contiene la composición física y química que se adjunta en el folio siguiente.

Laboratorio de Análisis Químicos
Informe de Control de Calidad
Insumos Agrícolas

Registrado ante el ICA según Resolución 03775

REMITENTE	GERMÁN VIASUS		
Identificación Suministrada	ABONO ORGANICO TIERRA VIVA		
DESCRIPCIÓN	Sólido café	No. Laboratorio	M.O. 3740
Fecha de Ingreso	15-jul-04	Fecha de Entrega	26-jul-04

RESULTADOS ANALÍTICOS

Humedad (%)	25.0
Cenizas (%)	23.9
Pérdidas por Volatilización (%)	51.1
Carbono Orgánico (%)	20.9
Cap. Intercambio Catiónico (me/100g)	50
Densidad (g/c.c. - Base Seca)	0.55
Capacidad de Retención de Humedad (%)	140
C/N	10
pH	7.74
Conductividad Eléctrica (dS/m)	16.1

ELEMENTO	RESULTADO	UNIDADES
Nitrógeno (N _T)	1.99	%
Fósforo Total (P ₂ O ₅)	1.70	%
Potasio (K ₂ O)	1.61	%
Calcio (CaO)	7.58	%
Magnesio (MgO)	0.41	%
Azufre	0.47	%
Hierro	2550	p.p.m.
Manganeso	74	p.p.m.
Cobre	17	p.p.m.
Zinc	92	p.p.m.
Boro	20	p.p.m.
Sodio	4313	p.p.m.
Residuo Insoluble en Ácido	6.66	%

OBSERVACIONES : RESULTADOS EN BASE HÚMEDA.

NOTAS:

1. Si usted tiene alguna inquietud, queja o reclamo sobre sus resultados, por favor comuníquese con el Director Técnico o con el Jefe de Laboratorio.
2. El alcance de la responsabilidad de AGRILAB en el presente informe, se limita a la realización de los análisis de laboratorio relacionados y descritos anteriormente, más NO A GARANTIZAR los productos en su concepción, diseño, calidad y eficiencia.
3. Los resultados analíticos consignados en el presente informe corresponden exclusivamente a la muestra enviada por el cliente y no a otro (s) materiales de la misma procedencia.

ATENTAMENTE,

Myriam Bendeck Lugo
MYRIAM BENDECK LUGO
Química Director Técnico PQ-1168

Myriam Rocío Melgarejo P.
MYRIAM ROCÍO MELGAREJO P.
Química Jefe de Laboratorio PQ-1316

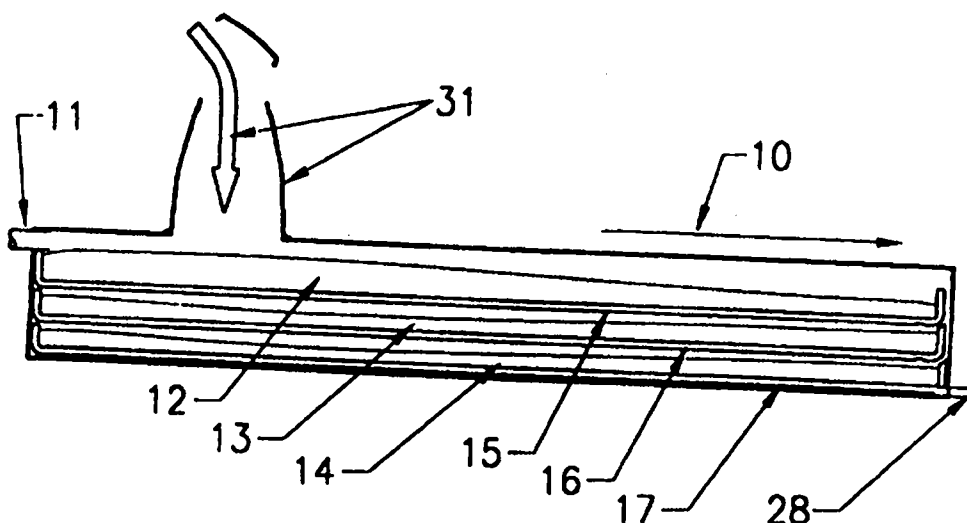
7. El proceso de 1, donde y larvas de escarabajo para hacer harina i, las larvas de escarabajos se pueden aprovechar para hacer harina con la cual se puede elaborar un alimento concentrado para alimentar aves de corral.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C02F 3/04	A1	(11) International Publication Number: WO 96/31437 (43) International Publication Date: 10 October 1996 (10.10.96)
(21) International Application Number: PCT/AU96/00203 (22) International Filing Date: 9 April 1996 (09.04.96) (30) Priority Data: PN 2223 7 April 1995 (07.04.95) AU (71) Applicant (for all designated States except US): DOWMUS PTY. LTD. [AU/AU]; 3 Benecke Road, Maleny, QLD 4552 (AU). (72) Inventor; and (75) Inventor/Applicant (for US only): CAMERON, Dean, Osman [AU/AU]; 214 Montville Road, Maleny, QLD 4552 (AU). (74) Agent: CULLEN & CO.; G.P.O. Box 1074, Brisbane, QLD 4001 (AU).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report.

(54) Title: EFFLUENT TREATMENT SYSTEM



(57) Abstract

A treatment system for liquid or liquid and solid effluent. The system is enclosed within a pipe, duct (10) or trench and comprises one or more sloping filter beds (12, 13, 14) with a population of effluent decomposing organisms such as earthworms and moths, and an overlying air space. The aqueous media effluent inlet (11) is located above the uppermost filter bed at an upper end and the solid waste input inlet (31), when included, is located downstream of the aqueous media inlet so that the aqueous media flows through and around the solid waste material. A filtrate outlet (28) is located downstream of the flow through the system and manual or conveyor means are

EFFLUENT TREATMENT SYSTEM**Background of the Invention**

THIS invention relates to the treatment of aqueous media and solid organic material to remove constituents which are hazardous or toxic to humans or the environment.

Conveyancing pipes or ducts used in conventional aqueous media treatment systems are not specifically engineered to effect any treatment, and consequently very little effective treatment occurs inside most pipes leading to or from treatment systems despite the fact that the pipes contribute substantially to the cost of the overall waste treatment system. In centralised sewerage treatment schemes the collection system can cost as much as the treatment plant to install. In a typical on-site treatment system for a single detached dwelling, 10 to 20 metres of 100 mm diameter pipework, or equivalent, leads to the treatment chamber, and a further 20 to 30 metres leads from the treatment chamber to the disposal/re-use area. Within the disposal area another 20 to 40 metres of pipe is commonly used in addition to trench support material, aggregate liners, and the like. Typically the treatment chamber is designed to be relatively large in order to provide sufficient retention time for treatment. Both aerobic and anaerobic treatment systems are typically bulky and deep in order to provide sufficient retention time for aqueous media treatment.

In sewered allotments there is much more than the equivalent of 60 metres of 100 mm diameter pipe, when a share of the common reticulation network is apportioned to each connection serviced

Aqueous media pipes have much to recommend them as aerobic treatment systems. They have a vented air space available above the aqueous media level most of the time, are usually out of sight, and are often installed in the ground or in buildings where the extremes of temperature are moderated.

A method of using a bed of decomposed and decomposing solid organic waste material to filter aqueous media is known and used commercially. The method uses a relatively deep bed thickness to effect the filtration. It also employs a technique where the filter bed is more or less evenly loaded. This results in some practical constraints.

1. The outlet drain for the treated water is considerably lower than the aqueous media inlet pipe. This often results in a need to pump the effluent where the land is fairly flat or where the water table is high.

2. The bio-solids removed from the system are continually recontaminated, and pathogens are not deactivated before removal.

3. Opportunity exists during heavy loading periods for the bed to be temporarily inundated since the aqueous media cannot flow anywhere else. This results in a less diverse community of breakdown organisms being able to survive under these circumstances.

4. A treatment chamber with horizontally arranged long axis has a higher surface area than a vertically arranged treatment chamber.

Object of the Invention

One object of the invention is to avoid the use of pipes whose sole function is to convey effluent to treatment systems.

Another object of the invention is to overcome the problems of existing effluent treatment systems as mentioned above.

Summary of the Invention

According to the present invention there is provided an enclosed effluent treatment system incorporating a sloping filter bed with a living population of effluent decomposing organisms and an overlying air space, an aqueous effluent media inlet above the filter bed at an upper end thereof, a filtered aqueous media outlet and, optionally, a solid waste input region downstream of the aqueous media inlet and means

for solids removal.

The invention thus covers both an aqueous media purification system and an aqueous media and solid organic waste treatment system. The term "effluent" used
5 throughout the specification can refer to one or other of these input streams.

Detailed Description of the Invention

Where more than one filter bed is configured, the beds are preferably stacked in vertical layers.
10 Preferably there is a ventilated space between these beds.

The filter bed(s) is(are) enclosed to prevent contamination of the environment by the waste material or potential vectors of disease. The enclosure can
15 typically comprise a pipe, duct or trench. A duct or pipe typically includes a longitudinal lower inner surface with the filter bed arranged above that surface and extending the length of the duct or pipe.

A solid organic waste input chute may be
20 arranged downstream of the aqueous media inlet in such a way that the aqueous media is caused to flow through and around the solid organic waste material added through the input chute.

In one form of the invention, one of the filter
25 beds functions as a conveyor belt to discharge decomposed organic material at a downstream end of the treatment system. In another form of the invention, decomposed organic material is transmitted through the or each filter bed and is removed from a downstream end of the
30 treatment system by filtrate flow.

A means of collecting the filtrate which filters through the filter bed/s may be arranged below the lowest filter bed, or if the filtrate is not required, then the filtrate may infiltrate directly into
35 the soil below the lowest filter bed.

The build up of decomposed organic matter, non-biodegradable solids or slime growth from the surface of the filter bed(s) is suitably carried out as required.

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The treatment system can be mounted free standing or suspended below a floor, buried under a floor slab or buried in the ground, or have any other suitable configuration for the particular treatment being carried out.

A flow of aqueous media to be treated enters the system via an aqueous media pipe or series of pipes and is caused to pass along and through the filter bed(s).

If the system is designed to treat solid organic waste material then the organic waste material is either placed directly in the system in a more or less unprocessed form, for instance from a food waste scrap bucket or wastepaper bin or the like, through the solid waste entry chute located downstream of the aqueous media entry pipe, or it may be processed through a waste grinder and so enter the system as a constituent of the aqueous media. The input flow of aqueous media washes and deposits the solid organic waste material along the surface of the filter bed. The liquid portion of the aqueous media infiltrates into the filter material which forms the bed and can be either collected for some reuse purpose or discharged onto a second filter bed or into the soil. The solid organic waste material is retained in and on the filter bed.

The size of the air space required above the filter bed is determined by the largest particle size of the solid organic material added to the filter bed.

The waste matter added to the filter bed decomposes rapidly in the presence of the moisture and air contacting the organic fragments left behind as the liquid portion passes through the filter bed.

Air above and through the pore spaces in the filter bed, moisture from the aqueous media, and energy and nutrients in the solid organic matter or dissolved and suspended in the aqueous media, provide a very good environment for organic decay by endemic microorganisms in the aqueous media, and introduced or ubiquitous

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invertebrates and microbes living in and on the decomposing and decomposed organic material.

One form of the present invention uses actively decomposing solid waste and fully composted waste as a physical and biological filter medium for waste water.

Solid putrescible wastes adjacent the entry will act as a media for biofilm growth as aqueous media is applied. Large discrete waste particles are continually added and continually digested by the organisms and eroded by aqueous media so that they are constantly breaking up into smaller and smaller particles ultimately forming stable humic colloids and dissolved humic compounds. The wetting and drying cycles combined with the extrusion of discrete worm casts and insect and mite frass create a relatively stable compost crumb structure within the compost bed formed from the decomposed solids in the enclosure.

The movement of worms, beetles, mites, collembola and insect larvae throughout the compost aerates the compost medium and prevents the internal drainage of the bed from blocking. Thus the compost bed comes to act like a well-drained soil bed with a huge wetted surface area for oxygen exchange. Air is drawn into the compost bed every time waste water is pulsed onto it by normal sporadic household usage. Partial inundation of the compost bed surface occurs with normal usage. Where this happens, waste water infiltrates rapidly through the biopores and acts like a hydraulic piston to draw fresh air into these pore spaces.

Unlike aquatic treatment systems, the present invention quickly filters out the larger solid wastes (which have a high oxygen demand) onto the surface of the compost bed where they are surrounded by air. Since air is 22% oxygen, and has much faster diffusion rates than water, much higher biological loadings can be treated this way.

If the solid organic waste material input is large the solid organic fragments themselves form a large

surface area media which acts as a trickling filter aggregate when wetted by the aqueous media flowing over and around such fragments.

5 The compost produced by the decay of the solid organic waste material which accumulate on the surface of the filter bed acts as a fine aerobic filter medium and adsorptive treatment contact surface.

10 The enclosure is constructed so that the aqueous media is caused to flow longitudinally along the sloping surface of the filter bed away from the input end of the enclosure.

15 The surface of the filter bed and any organic matter build-up is prevented from blocking by the action of worms, mothflies, mites, collembola and other soil organisms.

The infiltration rate and surface area exposed to the air can be increased by adding a bulking agent such as polystyrene beads or granules to the surface of the filter bed.

20 The fine compost like organic media provides a habitat for invertebrates and microbes feeding on the organic material.

25 The compost bed acts as a self regenerating filter medium for the waste water and can also be used to create a suitable habitat to support organisms which decompose solid organic wastes into stable humic compounds.

The waste water may flow into the pipe or duct at one or more points along the pipe or duct.

30 The waste water will infiltrate into the compost bed over various distances along the length of the compost bed depending on the input flow rate, duration, and waste water infiltration rate. A high flow rate over an extended period of time will
35 infiltrate for the greatest distance along the compost bed. For any particular situation, it is preferred that the compost bed be long enough so that a far end portion of the bed will be only wetted occasionally during peak

hydraulic loading events.

The infiltration rate will vary along the length of the compost bed according to the permeability of the combined solid waste layer, compost bed and compost bed support medium. In the frequently wetted high flow zone a zoogloeal slime of microorganisms and fine particulate solids can coat the surface of the compost bed and particulate solid wastes and lead to a lower permeability in the influent high loading zone than that at the limit of infiltration. This desirable phenomenon will also be observed laterally across the surface of the filter bed if the inner surface is curved so that the lowest point is away from the edges of the bed.

Solid wastes are distributed over the surface by the flowing waste water. The pattern of distribution is related to the waste water velocity, hydraulic flow and infiltration pattern along the compost bed as well as the solids particle size, shape, buoyancy, stickiness, mechanical strength, decomposition rate and errodability. Erosion of the surface of the compost /solid waste deposits is related to the waste water velocity as well as the surface characteristics. Erosion in general moves smaller crumbs or particles but movement of larger fragments can also occur where large aqueous media flow rates can carry large buoyant solids along the filter bed to the point where the friction between the solid particle and the filter bed is greater than the frictional drag on the solid particle produced by flowing aqueous media.

Typically, the shape and length of the enclosure and ~~filter bed are so arranged,~~ and organisms ~~therein are so managed,~~ that ~~the rate of compost removed~~ from the enclosure is approximately equal to the amount of ~~compost produced.~~

~~Bio-solids are produced~~ by the system which can be ~~harvested as structured compost like material.~~ Harvesting should preferably occur after a period of low hydraulic inputs to the system.

Filtered effluent is also discharged from below the lowest filter bed. It may be allowed to infiltrate into the soil without further treatment or it may be collected and reused for some specific purpose. Where
5 secondary filter beds are employed the filtrate can be of sufficient quality to safely reuse for toilet flushing, garden watering, and the like.

The solid organic material is progressively moved from the entry point to the discharge end as it
10 decomposes by various methods as described below.

Biological activity can also result in the mass movement of solids. In particular the activity of composting worms and various species of insects (such as
15 mothfly larvae) produces small friable castings and frass which are usually deposited in such a way as to level out the longitudinal surface topography of the compost bed. Because of a preference of worms to cast in the drier edge zones, the lateral curve of the bed surface is maintained. This activity decreases the bulk density of
20 the compost bed surface and also increases the infiltration rate. The combined effect is to increase the errodability of the surface during high surface flow rates.

The biological activity will stabilise in time
25 to reflect the complex interaction of various critical gradients such as moisture content, food availability, oxygen supply and temperature. Population gradients which relate to each particular organism's ability to competitively exploit a particular habitat niche will be
30 evident.

In time selective pressure will result in the evolution of more precisely adapted organisms from all the species represented, which can exploit hotter, wetter or lower oxygen zones more efficiently.

35 Blockage of the surface flow could occur if particulate build up on the filter bed occurs to the point where peak flow is dammed within the duct and does not disperse the build-up of solids over a sufficient

area to allow the maintenance of a dynamic equilibrium between deposition and decomposition rates.

Biological activity maintains the height of the compost/solid waste surfaces in a dynamic equilibrium.

5 This means that solids are washed down the length of the compost bed and moved downwards through the solids permeable compost bed through washing and biological activity at the same rate as they are deposited. Internal blockages can occur if the bed support material
10 has a pore size too small to transmit very fine solids and these accumulate within the bed and slow the infiltration rate down to the point where the hydraulic application rates consistently exceed filter bed infiltration rates. To avoid this the bed can be
15 configured to be permeable to very fine colloidal solids or to larger particle sizes by manipulating the pore size of the bed material.

In practice where a reasonably high solid organic waste material application rate applies, a medium
20 with a 0.5 mm to 1 mm pore size has been shown to maintain an effective dynamic compost layer equilibrium in the upper layer.

If faster solid throughput rates are required for very high solid organic waste material application
25 rate systems, the pore size would be increased appropriately.

Where the aqueous media is relatively clean, the media used in the filter bed can be very fine and granular and should be soil and litter organisms such as
30 earth worms and/or mothflies to consume the growth of microorganisms which grow on and are filtered out by the media. Fine sand, powdered activated carbon or other suitable granular material usually with an effective particle size of 0.1 mm or less are two preferred media
35 if the filtrate is to be recycled for flushing or a similar use. Where the aqueous media application rate exceeds the infiltration rate there will be a surface flow. This can be used to advantage to transport the

fine composted solid organic waste material to the lower end of the treatment system where it can be conveniently accessed for removal.

5 The size of the pipe or duct required will depend on the solids and hydraulic loading rates applied. High solids loadings will require steeper gradients and hence higher waste water flow velocities to produce a larger surface area and hence infiltration zone. The slope of the pipe or duct should be such that the
10 deposition of solid materials is spread evenly along a sufficiently long length of the compost bed to allow the decomposition and compost removal rate to equal the raw solids deposition rate.

15 A range of filter bed gradients can be used depending on the solid application rate, size of the solids applied and aqueous media application rates. The slope of the filter bed should be designed to achieve more even solids distribution over the surface of the filter bed.

20 If the treatment duct gradient is high, transverse baffles perpendicular to the waste water flow direction may be required to prevent the compost bed from eroding too quickly and allowing unfiltered waste water to pass through the supporting material openings.
25 Because the infiltration rate and errodability of the solid organic waste material and bed medium will vary along the length of the treatment duct, the gradient of the filter bed may also need to be adjusted along the length of the treatment duct for some applications.

30 Where the bed is to be mechanically progressed it is preferable to design the system so that the peak flow infiltration zone stops well short of the end of the compost bed so as to allow a compost maturation zone which is not re-contaminated by pathogens from the waste
35 water prior to harvesting.

In a low solids loading situation passive transport of solids by waste water movement and biological activity could be used in conjunction with

periodic servicing of the bed to remove non-compostable and slowly degradable composted solids. Such servicing could be effected by a jet or series of water jets directed onto the compost bed in such a way as to flush
5 off surface build-up of compost and non-compostable solids.

These fine composted solids could be filtered out of the filtrate by a filtration material located at the filtrate discharge point/s or filtered out by a
10 second finer, in duct filter bed medium, positioned so as to accept the primary compost bed filtrate and the organic solids washed through the primary filter bed.

In the case of high solids input rates and or the addition of large non- compostable solids such as
15 plastics, glass or metals, it may be necessary to form the compost bed to be movable so as to discharge the build up of solid material at some point or points along the length of the container. Ideally the discharge of solid material would only occur after a sufficient
20 interval has elapsed from when fresh wastes were last deposited to allow for their complete decomposition to pathogen free stable humus.

The internal volume within the container, duct or pipe must be large enough to prevent the occlusion of
25 the pipe given a specific solid organic waste material movement rate and solids deposition rate. The movement of the solids in a high solids loading application may be effected by forming the compost bed support medium into an endless conveyor belt and causing it to rotate slowly or in pulses toward the compost discharge point(s). A
30 motor or mechanism driven by the combined water flow into the building serviced could be used to provide a regulated movement related to aqueous media flow rates.

The enclosure, pipe or ducting employed to hold
35 compost is preferably so sized and dimensioned as to cater for the particular waste loadings for the environment of use.

Preferably, the filter bed comprises a

non-biodegradable support media, such as durable fibre wadding, durable thermo-plastic textile or linear drainage ducting, extending along the enclosure dividing the enclosure into upper and lower regions and being adapted to pass aqueous media and finely divided organic material, the upper region being adapted to hold partially decomposed organic material and compost, and the enclosure having a cross-section and length, and supporting sufficient filtration media so that aqueous media entering the enclosure is absorbed in the length of compost in the enclosure. The enclosure can include a means for dislodging or washing off undesirable surface build up from the filter bed. In one example, the dislodging or washing off means comprises a plurality of water jets spaced along the enclosure and control means to operate the jets at predetermined times.

In another embodiment, a secondary filter bed can be employed beneath the primary filter bed. This enables removal of fine particulate organic material which wash through the coarse primary filter bed media.

In this application of the present invention to in-duct or in-pipe treatment a long thin compost bed is formed on a fixed or movable support medium, typically a non-biodegradable thermo-plastic fibrous material within the duct or pipe.

Description of the Drawings

Figure 1 is a cross-sectional view of an enclosed effluent treatment system according to one aspect of the present invention;

Figure 2 is an enlarged end-sectional view of the system of Figure 1;

Figure 3 is an enlarged partial view of the left end section illustrated in Figure 1;

Figure 4 is an enlarged partial view of the right end section illustrated in Figure 1; and

Figure 5 is an end-sectional view of an enclosed effluent treatment system according to another aspect of the present invention.

In all of the drawings, like reference numerals refer to like parts.

Description of Preferred Embodiments

Example 1

5 This example concerns a duct treatment system for treating wastewater and solid organic waste so as to recover and store the filtrate for reuse in toilet flushing or like grey water applications.

10 Referring to Figures 1 to 4, the treatment system comprises an extruded plastic duct 10 with appropriate reinforcement ribbing, as the treatment enclosure. The enclosure is mounted on an inclination of approximately 1:100 with the higher end containing the inlet 11 for wastewater and solid organic waste material.

15 Three filter beds 12, 13, 14 are supported by three drainage support elements 15, 16, 17 which are slidably removable in grooves 18, 19, 20 located on the sides of the duct. Sides are provided on the drainage support elements to contain the filter media placed or
20 formed thereon and so as to enable the entire filter beds and support elements to be clearly removed for servicing or media replacement.

25 The drainage support element beds are provided with material covers both above and below the horizontal surfaces. The uppermost drainage support element 15 is provided on its upper surface with a knitted thermoplastic fibre material 21 having a hole size of approximately 1mm. The lower surface of the drainage support element 15 has a geotextile fabric 22 adhered
30 thereto. A similar geotextile fabric 23, 24 is fitted to the other two support elements, over their upper and lower surfaces.

35 Ventilation spaces 25, 26, 27 are provided at each end of the drainage support elements to enable excess wastewater to bypass in high loading times. At the downstream end there is provided a drainage passageway to enable this water to bypass to the secondary and tertiary filter beds 13, 14.

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A solids input chute 31 is located on the downward slope spaced from the wastewater inlet 11 and a filtrate outlet 28 is located at the lowermost region of the enclosure.

5 In use, wastewater enters by way of inlet 11 and waste solids by way of chute 31. The chute is arranged so as to cause the wastewater to flow through and around the waste solids on the primary filter bed 12. The primary filter bed is designed to enable fine
10 composted material to wash through the bed assisted by the action of the organisms in the bed. Once through this layer the fine compost accumulates over the geotextile layer and forms a second thin filtration bed of compost. The compost in this layer is only slightly
15 heavier than water and is easily eroded and carried down stream and discharged through the drain hole 20. Once deposited onto the second filter bed 13 the fine suspended solid organic material is easily removed during low water usage periods by removing a duct end cover and
20 sliding out the filter bed support element.

The upper filter bed 12 can be made to work more efficiently by adding polystyrene foam beads or some similar bulking material 30 to the surface of the filter bed.

25 The filtrate exiting from the outlet 28 is suitable for collection and used in recovered water applications such as toilet flushing, landscape irrigation and such like.

Example 2

30 In this example there is no requirement to reuse the filtrate. In this case a slotted ribbed pipe 50 of at least 150mm is wrapped in geotextile fabric 51 and mounted on a bed of fine sand 52 and backfilled with 20mm rock aggregate or similar. The lumen of the pipe
35 has a removable element 53 of slotted drainage pipe which has a spacer 54 under it and a thermoplastic knitted mesh fabric 55 with a hole size of approximately 1mm. The pipe may be continuously formed between the waste water

source and a biosolids collection pit, or may connect several point sources and have biosolids collection pits at appropriate intervals. The effluent discharged through slots 56 in the pipe infiltrates into the soil under and surrounding the pipe. The removable element 53 in the lumen of the pipe enables servicing of the filter bed at long intervals to remove any accumulated non-compostable solids.

CLAIMS:

1. An enclosed effluent treatment system incorporating a sloping filter bed with a living population of effluent decomposing organisms and an overlying air space, an aqueous media effluent inlet above the filter bed at an upper end thereof, a filtered aqueous media outlet and, optionally, a solid waste input region downstream of the aqueous media inlet and means for solids removal.
2. A treatment system as claimed in claim 1, wherein the filter bed comprises a plurality of filter beds stacked in vertical layers.
3. A treatment system as claimed in claim 1 or claim 2, wherein the filter bed(s) is(are) enclosed within a duct, pipe or trench.
4. A treatment system as claimed in claim 1 or claim 2, wherein the filter bed(s) is(are) enclosed within a duct and is(are) removable through the ends of the duct.
5. A treatment system as claimed in claim 1 or claim 2, and incorporating a solid waste input region which comprises a chute arranged so as to cause aqueous media to flow through and around the solid waste material added by way of the chute.
6. A treatment system as claimed in claim 1 or claim 2, wherein the or one of the filter beds functions as a conveyor belt to discharge decomposed organic material at a downstream end of the treatment system.
7. A treatment system as claimed in claim 1 or claim 2, wherein decomposed organic material is transmitted through the or each filter bed and is removed from a downstream end of the treatment system by filtrate

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flow.

8. A treatment system as claimed in claim 1 or claim 2, wherein the uppermost filter bed is partially
5 comprised of a compost bed.

9. A treatment system as claimed in claim 1 or claim 2, wherein the or at least one of the filter beds is comprised of a granular material which is populated
10 with soil and litter organisms such as earthworms and/or mothflies.

10. A treatment system as claimed in claim 1 or claim 2, wherein the filter bed(s) is(are) enclosed
15 within a trench and the filtered aqueous media outlet is the ground forming the base of the trench.

11. A treatment system as claimed in claim 1 or claim 2, wherein a bulking material is added to the
20 surface of the or each filter bed to increase the aerobic capacity and infiltration rate.

12. A treatment system as claimed in claim 1 or claim 2, wherein the filter bed(s) is (are) enclosed
25 within a duct constructed from ribbed thermo-plastic with longitudinal grooves formed in the sides to support a removable thermo-plastic drainage and support element.

13. ~~A treatment system~~ as claimed in claim 1 or claim 2, wherein the effluent decomposing organisms are selected from the group consisting of soil and litter
30 organisms such as earthworms, beetles, mites, and insect larvae.

14. An effluent treatment system substantially as
35 herein described with reference to the accompanying examples and drawings.

1/2

Fig 1

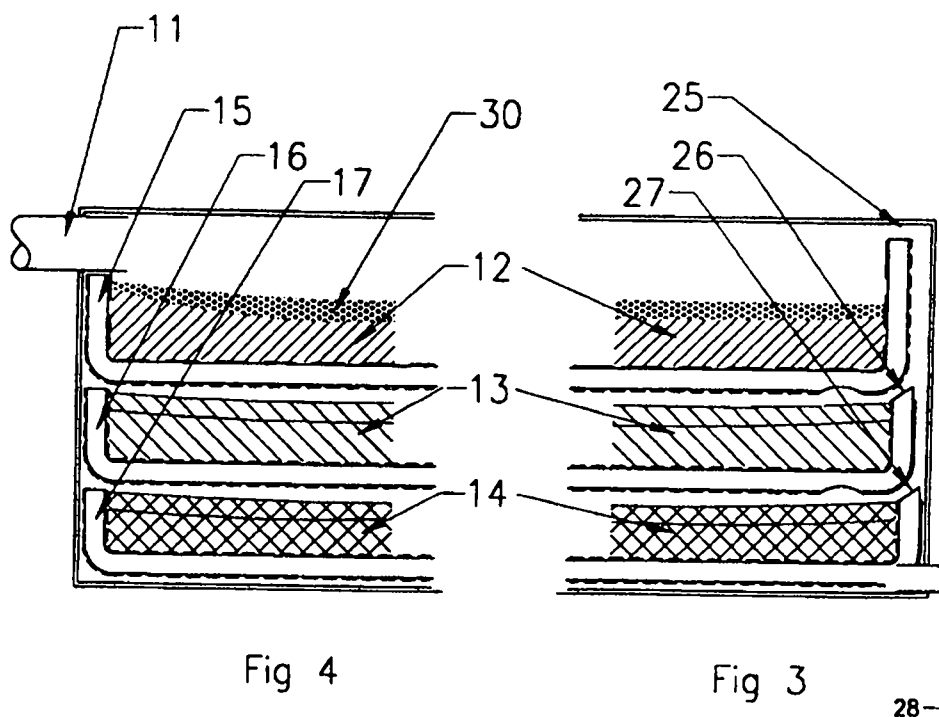
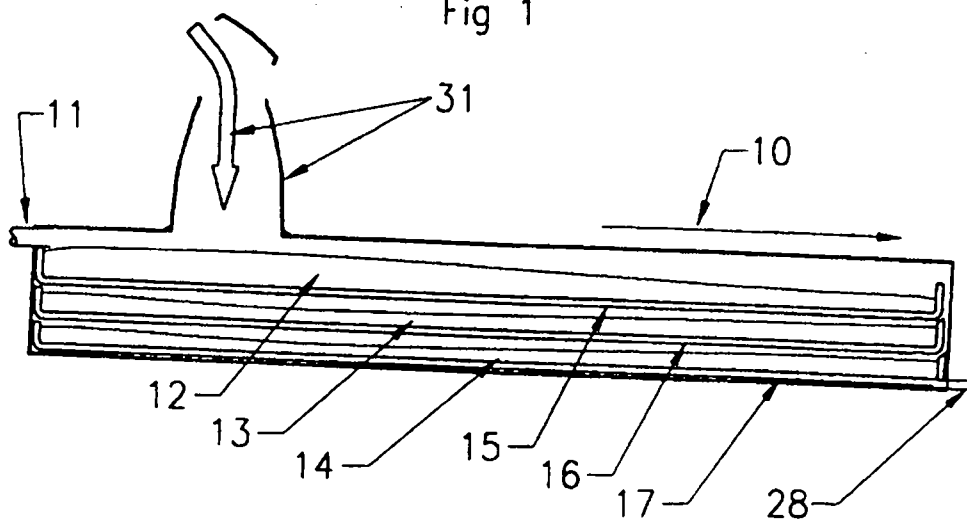


Fig 4

Fig 3

Fig 2

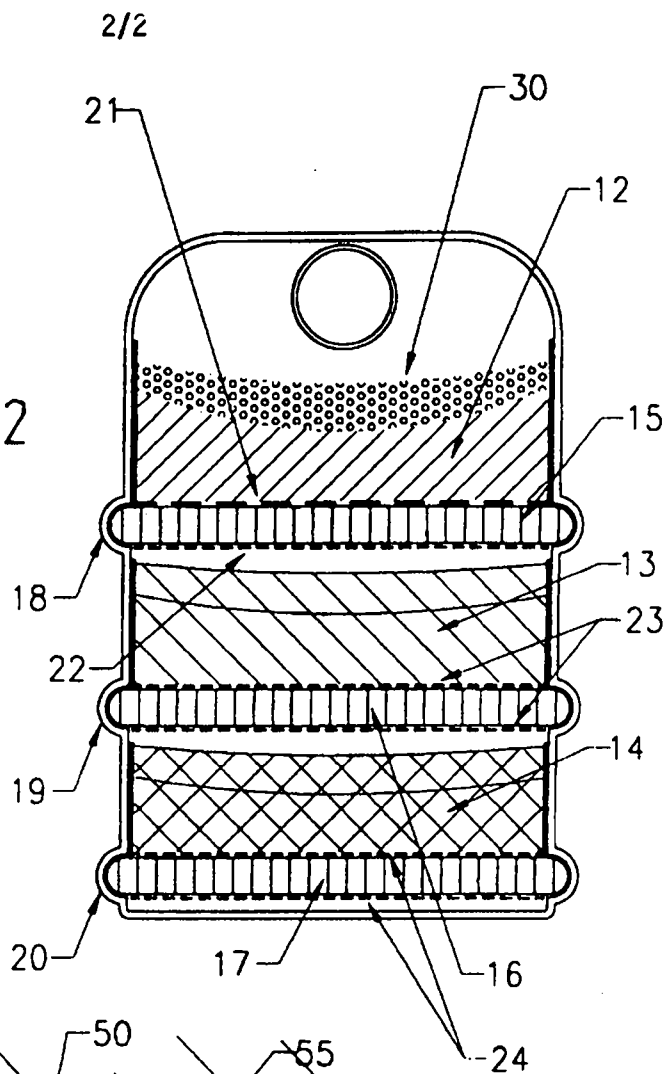
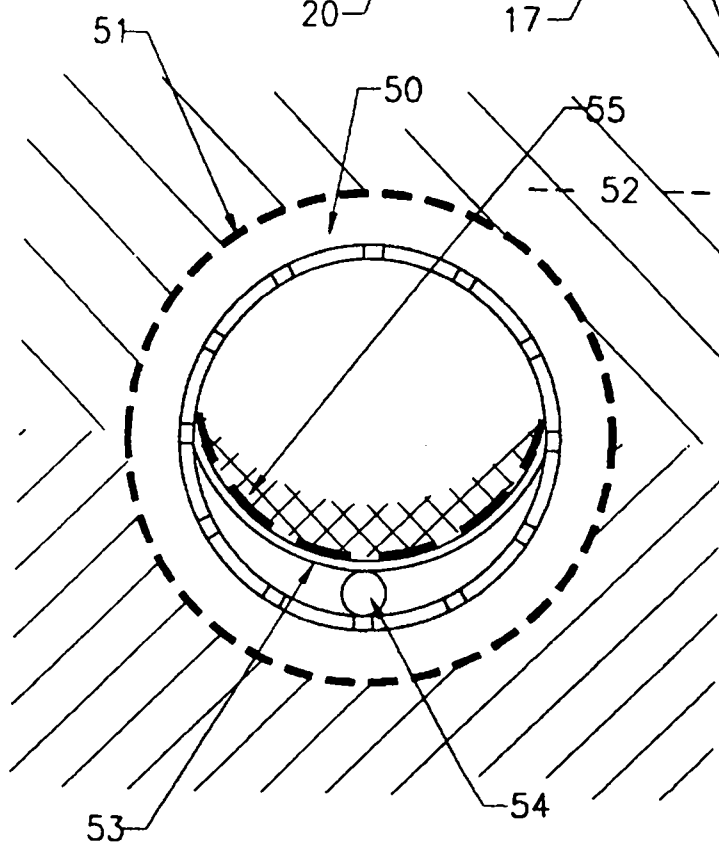


Fig 5



D2156

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



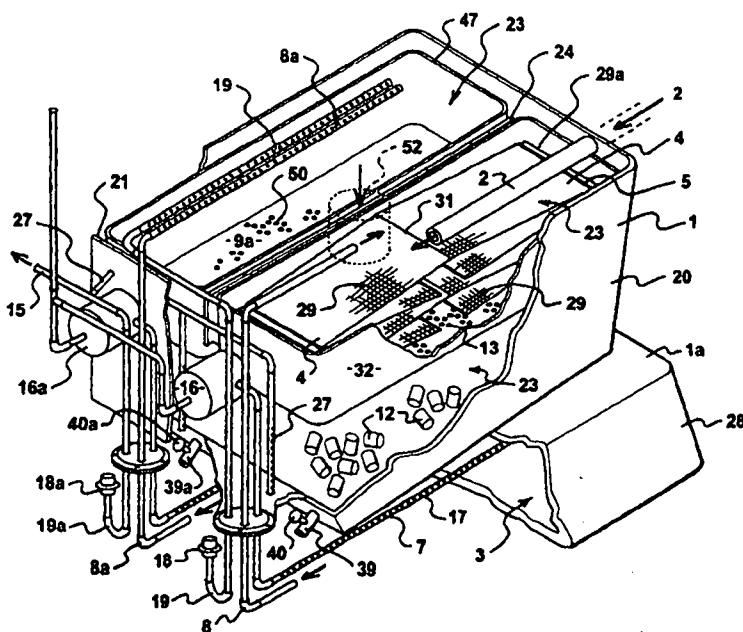
(43) International Publication Date
15 February 2001 (15.02.2001)

PCT

(10) International Publication Number
WO 01/10787 A1

- (51) International Patent Classification⁷: C02F 3/06, 3/20, 11/02
- (21) International Application Number: PCT/NZ00/00033
- (22) International Filing Date: 20 March 2000 (20.03.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
337156 9 August 1999 (09.08.1999) NZ
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AN APPARATUS FOR TREATING WASTEWATER



(57) Abstract: An apparatus to filter and assist the aerobic biological treatment, in stages, of liquid waste effluent such as sewage and other household degradable wastes. A hollow body is enclosed other than for a waste inlet and a filtrate outlet. The inlet discharges onto solids entrapment means mounted on a drain plate in an aerated void within the body. The trapped solids are seeded with a quantity of organisms such as worms and beetles to create a biomass which acts to break down the trapped solids. A diffuser is provided to receive the permeation from the entrapment means. The diffuser is aerated and provides a substantial surface area over which the permeation flows. Permeation settling on the diffuser forms a slime which continues the breaking down action of the biomass. Permeation from the diffuser is preferably

transferred to a reservoir adapted to be pressured and air pumping means are directed thereinto. The filtrate outlet conduit has an intake controlled by a float valve in an upper part of the reservoir. A recycle conduit has an intake in a lower part of the reservoir and discharges onto the entrapment means. Control means are provided for the periodic pressurisation of the reservoir to recycle some of the permeation in the reservoir. Also, if the quantity of permeation is such as to open the outlet valve to expel some of the permeation from the filtrate outlet. Secondary filters and a second reservoir can be provided between the first reservoir and the filtrate outlet. The second reservoir operates substantially the same as the first reservoir, the recycle conduit thereof discharging onto the outlet filters



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TITLE: AN APPARATUS FOR TREATING WASTEWATER**TECHNICAL FIELD OF THE INVENTION**

This invention relates to an apparatus for treating waste foul water including sewage, industrial waste liquids containing decomposable material and the like, hereinafter referred to
5 as liquid waste effluent, to create an acceptable filtrate.

BACKGROUND OF THE INVENTION

Many methods and apparatus are known for the anaerobic and also aerobic treatment of waste effluent. An intention of this invention is to provide an apparatus for the essentially aerobic treatment of waste effluent. More particularly the invention relates to an apparatus
10 for treating liquid waste effluent that includes means for separating and breaking down in stages quantities of solid waste in the liquid waste effluent. The permeation from each stage is passed to the next stage. In addition at least the primary stages are arranged such that the separated solids contain organisms, hereinafter collectively referred to as a "biomass", resulting in the break down of the solids.

15 A further intention of this invention is to provide such an apparatus that includes a first stage that separates out most solids of the waste effluent and retains the resultant biomass in a substantially enclosed but aerated void. In the second stage the permeation from the first stage is diffused to create a slime to continue the breaking down action.

Yet a further intention is to provide recycle means for the downstream permeation's that
20 they can be charged back onto the first stage separation means. Operated at intervals the recycle means provides a nominal liquid waste effluent input regardless of the actual usage load. At times of low or no usage the recycle means maintains the integrity of the biomass and at times of high usage provides a flushing action to reduce the possibility of clogging. Also the recycle means is utilised to extend the period over which filtrate is discharged from
25 the apparatus. In times of high usage this reduces the possibility of a disposal means provided for the filtrate being unable to cope. The staged arrangement of the biomasses together with the facilities for recycling the permeation's enables a substantially continuous

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essentially aerobic break down of the solid content of liquid waste effluent to create an acceptable filtrate.

A further intention is to provide the public with a useful choice over known liquid waste effluent treatment apparatus. In particular it is envisaged the apparatus will meet
5 environmental standards and waste discharge regulations rendering the apparatus suitable for treating sewage and related foul water from individual and multiunit dwellings. Disposal of the filtrate maybe by various known means such as evaporation and/or irrigation, ground drainage. Such disposal means do not form part of the invention.

DISCLOSURE OF THE INVENTION

- 10 According to a first aspect of this invention there is provided an apparatus for the biological treatment of liquid waste effluent comprising a substantially enclosed body having a liquid waste effluent inlet and a filtrate outlet, at least one drain plate adapted to have solids entrapment means thereon and disposed in an aerated void within the body adjacently
beneath the inlet as will in use trap solids within effluent entering via the inlet as will in use
15 enable, in conjunction with a quantity of organisms, the creation of a biomass to break down trapped solids, and a diffuser to provide a substantial aerated surface area over which permeation from the solids entrapment means flows whereby permeation settling on the surface area forms a slime to continue the breaking down action, the diffuser joining to the filtrate outlet.
- 20 According to a second aspect of this invention there is provided an apparatus as described in the preceding paragraph including a reservoir is disposed lower than the diffuser to receive permeation discharging therefrom and controllable means are provided to pump permeation from the reservoir to the filtrate outlet.

According to a third aspect of this invention there is provided an apparatus as described in
25 the preceding paragraph wherein the reservoir is adapted for pressurisation and has an outlet conduit having a controllable intake disposed in an upper section thereof and which terminates at the filtrate outlet, the reservoir also having a recycle conduit with an intake

below the apex 31 of the upper pair. This sequence is preferably repeated twice to provide four pair sets of drain plates supporting solids entrapment means 29. Preferably the entrapment means 29 and drain plates 4 are mounted within an open topped bath 32 which in turn is mounted in an upper section of void 23. To assist in directing and controlling drainage, drain plates 4 may incorporate a small weir 5 at their lower ends. Also preferably the upper ends of the inwardly inclined plates 4 abut the adjacent side of the bath 32.

Referring in particular to Fig 4 the preferred entrapment means 29 comprise a series of plastic tiles 33. Each tile 33 has a pair of planar sides 34 spaced adjacently apart by a peripheral edge wall 35. Apertures 36 are formed through the sides 34 and edge wall 35 and a plurality of baffles 37 are formed in the interior of a tile 33. Alternatively, a bed of coarse aggregate material (not depicted) such as crushed rock or scoria can be supported on the plates 4. In yet a further embodiment (not depicted) the solids entrapment means 29 is integrally formed, such as by moulding, as part of the supporting drain plate 4. Solids within waste effluent discharging from inlet 2 and descending through the solids entrapment means 29 will tend to be trapped thereby. The solids entrapment means 29 are preferably seeded with effluent attacking organisms such as earthworms, insects and beetles to thus create with trapped solids a biomass (not depicted). Permeation from the solids entrapment means 29 is directed to a diffuser 12 and then preferably to a reservoir 3.

Diffuser 12 provides a substantial surface area over which the permeation from the solid entrapment means 29 flows. The permeation contains residual solids and is infiltrated with micro-organisms from the biomass and a quantity thereof settles on this surface area and forms a slime which continues the breaking down action of the residual solids. Preferably the diffuser 12 is formed by a plurality of hollow open-ended plastic components contained within the lower portion of void 23. Preferably bath 32 incorporates a plurality of apertures 13 throughout the bottom thereof which act as a disperser to direct the permeation therefrom over the diffuser 12 elements. A bottom 38 of body section 20 is preferably inclined leading to an outlet 39 joining into reservoir 3. A non-return valve 40 is provided at the outlet 39 to seal off void 23 from reservoir 3.

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES**

2020
Bogotá, D.C.,

Señor
GERMAN VIASUS TIBAMOSO

ASUNTO	Radicación	01-92136
	Trámite	002
	Evento	001
	Actuación	430
	Oficio	14053
	Folios	

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

Documentos estudiados:

Los textos estudiados fueron la descripción (Folios: 29 a 97) y las nuevas reivindicaciones 1 a 7 folios 132 a 135 que reemplazan las originalmente presentadas en los folios 118 a 119.

La presente solicitud no reivindica prioridad

Objeto de invención:

El objeto de la presente solicitud se refiere a un proceso biológico para la transformación de desechos orgánicos, para la obtención de un bioabono y harina para concentrado de aves como subproducto del proceso. El proceso abarca las etapas de:

1. Recolección de los residuos sólidos
2. Trituración de residuos
3. Alistado de camas para transformación
4. Obtención de bioabono y harina de escarabajo para concentrados para aves.

El objeto de la solicitud definido anteriormente se clasificó en la IPC C05F 9/00.

Claridad de la solicitud:

El artículo 30 de la Decisión 486 de la Comisión de la Comunidad Andina establece que: "Las reivindicaciones definirán la materia que se desea proteger mediante la patente. Deben ser claras y concisas y estar enteramente sustentadas por la descripción.

Las reivindicaciones podrán ser independientes o dependientes. Una reivindicación será independiente cuando defina la materia que se desea proteger sin referencia a otra reivindicación anterior. Una reivindicación será dependiente cuando defina la materia que se desea proteger refiriéndose a una reivindicación anterior. Una reivindicación que se refiera a dos o más reivindicaciones anteriores se considerará una reivindicación dependiente múltiple."

En el concepto técnico 864 de 21 de junio de 2007 se indicó al señor solicitante que el capítulo reivindicatorio estudiado entonces presentaba algunos defectos de claridad, sin embargo a pesar de las modificaciones realizadas, éstos se mantienen.

Las etapas del proceso para la transformación de residuo orgánico no exhiben características técnicas novedosas que lo puedan diferenciar de los procesos de obtención de compost convencionales o que representen un aporte significativo sobre lo que ya se conoce en este campo. 2

En el ejemplo de redacción de las cláusulas efectuadas por este despacho se indicó que debía indicar las características técnicas de las etapas que eran diferentes e inventivas (no obvias) respecto de los procesos ya conocidos para la obtención de abono orgánico. Sin embargo tras la descripción detallada de las etapas no se encuentra qué aspectos de la invención reclamada no se encuentran fuera del conocimiento de cualquier persona que trabaje en la obtención de abonos orgánicos. El alistamiento de material es obvio, la disposición de residuos en camas de no más de 30 cm es obvia, la inoculación SIN DEFINIR LAS CEPAS EMPLEADAS es obvia. El sustrato estabilizado, no es más que abono con composición indefinida. Se deja enununciada la etapa e) para decir que no existe tal etapa, en lugar de omitirla. La siembra de plantas antes de colocar las larvas de escarabajo, no es lógica. La etapa h) no constituye una etapa, es simplemente el resultado esperado a los 6 meses. El obtener el producto tampoco es una etapa. 2

Como se puede observar el proceso reclamado además de comprender etapas que no son tales, no define características que permitan a un tercero reproducir la invención y asegurarse de obtener los mismos resultados. ¿Cómo se puede obtener un abono con composición exacta si las materias no se han estandarizado? Por ejemplo residuo orgánico puede ser cualquier cosa, las cepas biológicas pueden ser la combinación de un sinnúmero de organismos que habitan el abono, y que pueden variar con el tiempo, la zona, el material de partida etc.... El tamizaje nunca puede ser considerado como una operación para obtener "cepa biológica". Así mismo el sustrato estabilizado puede presentar cualquier composición. 3 4

De acuerdo con lo anterior las cláusulas 1 y dependientes no cumplirían con los requisitos del artículo 30 de la Decisión 486.

Determinación del estado de la técnica:

El artículo 16 de la Decisión 486 de la Comisión de la Comunidad Andina establece que "El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de Patente o, en su caso, de la prioridad reconocida.

Sólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente, cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se estuviese examinando, siempre que dicho contenido esté incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40".

Considerando que la fecha de presentación de la primera solicitud de patente de la cual se reivindica prioridad es: 25 de octubre de 2005, se buscaron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta.

Se hizo la búsqueda de documentos relevantes en el estado de la técnica, entendiendo como estado de la técnica la definición provista en el artículo 16 de la

Decisión 486 de la Comisión de la Comunidad Andina y las excepciones fijadas en el artículo 17 de la misma.

Se encontró como anterioridades (documentos cuya fecha de publicación es anterior a la fecha de presentación de la solicitud que pueden afectar la patentabilidad del objeto de la presente solicitud:

Nº	Documento	Título	Fecha de Publicación
1	WO9631437	Effluent treatment system	1996-10-10
2	WO200110787	An apparatus for treatin wastewater	2001-02-15

Evaluación de los requisitos de Patentabilidad:

El Artículo 14 de la Decisión 486 de la Comisión de la Comunidad Andina el cual establece: "Los Países Miembros otorgarán Patentes para las invenciones, sean de producto o de procedimiento en todos los campos de la tecnología siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial".

Se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicación industrial con el fin de establecer la patentabilidad de la invención reivindicada en la solicitud en estudio.

Evaluación de Nivel Inventivo:

El artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina establece que "Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica".

Las reindicaciones 1 a 6 reclaman un proceso para la transformación de residuos orgánicos en abono, que comprende las etapas de a) alistamiento de material (triturar) b) dispones los residuos en camas con plástico como base y de una altura de 30 cm c) inocular las camas con cepa biológicas (indeterminadas), d) cubrir las camas con un sustrato estabilizado (indeterminado) g) colocar larvas de escarabajo Sembrar plantas en el abono

El proceso de compostaje es conocido por más de 100 años, las etapas generales que menciona el solicitante para definir el proceso que reclama, constituyen etapas convencionales de cualquier proceso de fermentación para la descomposición y transformación de desechos orgánicos en abono. Existen diferentes procesos en los que se combinan bacterias, rizhobacterias, hongos y demás microorganismos junto con lombrices o larvas de insectos existentes en los suelos para obtener abonos orgánicos útiles en la siembra de diferentes cultivos. Dichos procesos han sido llevados incluso a escala industrial e incorporados en sistemas complejos, como en el diseño de plantas de tratamiento. De hecho en los documentos D1 y D2 se mencionan métodos de transformación de residuos en las cuales los sistemas de tratamiento incluyen etapas de compostaje de sólidos en donde se emplean organismos del suelo (mencionando específicamente las larvas de insectos y escarabajos), o sistemas en los que se inoculan lombrices o escarabajos, para destruir los residuos sólidos. Es decir, el concepto de emplear biomasa existente en el suelo junto con larvas de insectos y escarabajos es tan conocido que incluso ha sido incorporado en sistemas de gran envergadura.

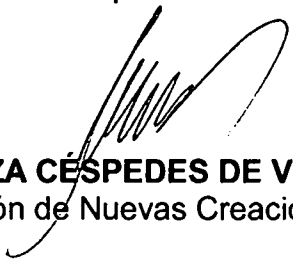
De la lectura de todo el documento no se encuentra evidencia de etapas que no se le hubieran podido ocurrir a un técnico versado en la materia, como tampoco hay efecto técnico inesperado del proceso, frente a los procesos de compostaje comunes y corrientes. (no es un proceso más eficiente, no hay mayor rendimiento)

La reivindicación 6 reclama el proceso caracterizado por el producto a obtener. Aún cuando el producto debería reivindicarse independientemente o indicando que es obtenido por el proceso anterior, cabe mencionar que no existe evidencia que el compostaje obtenido represente un salto cualitativo sobre abonos orgánicos comunes como el humus.

De acuerdo con lo anterior las cláusulas 1 a 7 carecerían de altura inventiva.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de la notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.



ALIX CARMENZA CÉSPEDES DE VERGEL

Jefe de la División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista, de fecha 17 8 NOV 2007

CONCEPTO TÉCNICO Nº: 2089	EXAMINADOR TÉCNICO Código Nº: 202063	2007-10-29
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