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Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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(54) Title: METHOD AND APPARATUS FOR TREATING WASTE MATERIAL

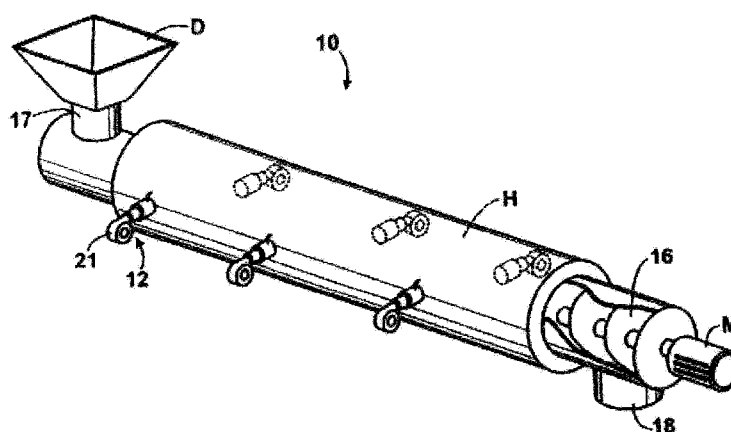


FIG. 2

(57) Abstract: An apparatus for treating waste comprising: an insulated structure having a plurality of heating assemblies being held thereof, insulated structure includes an insulated hollow outer shell member and hollow inner shell member, a waste heating chamber being defined by said inner shell member, each of said heating assemblies consisting of a pre-heating chamber with said heating chamber, a superheated steam producing means with said pre-heating chamber, and a burner fixedly held on said superheated steam producing means and being arranged to provide heat in said superheated steam producing means, pre-heating chamber and heating chamber, said superheated steam producing means being capable of transforming water into superheated steam through utilization of heat generated by said burner and facilitates introduction of hydrogen and oxygen gases derived from said superheated steam into the burner flame in the pre-heating chamber, and synthesis gas line being arranged to allow the introduction into the burner flame the synthesis gas produced during heating of the waste material within the waste heating chamber.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/PH 15/00009

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A62D 101/20, A62D 3/40 (2017.01)
CPC - A62D 3/40, C05F 3/00, C05G 3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0221597 A1 (BARBA) 4 December 2003 (04.12.2003); para [0003] [0016-0017] [0027-0028] [0030] [0033-0035]	1-5
A	US 2013/0299333 A1 (TUCKER et al.) 14 November 2013 (14.11.2013); entire document	1-5
A	US 4,490,349 A (HORVATH) 25 December 1984 (25.12.1984); entire document	1-5
A	US 2006/0112639 A1 (NICK et al.) 1 June 2006 (01.06.2006); entire document	1-5
A	US 3,884,163 A (ANKERSEN) 20 May 1975 (20.05.1975); entire document	1-5
A	US 4,261,795 A (REILLY) 14 April 1981 (14.04.1981); entire document	1-5

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

27 March 2017

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/PH 15/00009

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-5, directed to a method for treating waste materia

Group II: Claims 6-21, directed to an apparatus for treating waste material

*****Continued in Supplemental Box*****

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/PH 15/00009

Box III Observations where unity of invention is lacking

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special Technical Features:

Group I requires a method for treating waste material comprising the steps of: heating water at a pre-determined high temperature until it is converted into superheated steam; allowing said superheated steam to react with a catalyst to generate hydrogen and oxygen gases; introducing said hydrogen and oxygen gases into the flame being used for heating said water such that the heating value of the heat being generated by said flame is increased, d. heating waste material by said heat of increased heating value, not required by group II.

Group II requires an apparatus for treating waste material comprising: an insulated structure having a plurality of heating assemblies being held thereof, each of said heating assemblies being arranged in a manner wherein it is capable of providing flame heat in said insulated structure. said insulated structure being made such that it is capable of accommodating and disposing waste materials being heated and carbonized therein. insulated structure includes an insulated hollow outer shell member and hollow inner shell member that defines a heating chamber disposed therein, not required by group I

Common Technical Features:

Groups I and II share the technical feature of treating waste material comprising heating water; allowing said superheated steam to react with a catalyst to generate hydrogen and oxygen gases; introducing said hydrogen and oxygen gases into the flame, heating waste material by said heat of increased heating value; collecting synthesis gas produced during heating of said waste material, introducing said synthesis gas into the said flame, thereby removing highly toxic pollutants in the waste being treated; and carbonizing the waste materials

However, these shared technical features do not represent a contribution over prior art, because the shared technical feature is being obvious over US 2003/0221597 A1 to Barba (hereinafter 'Barba'). Barba discloses a method for treating waste material (para [0016] 'process for the pyrolysis of waste material') comprising heating waste material by said heat of increased heating value (para [0030] 'thereby allowing the hot gases to be transported from the oxidation chamber to a load chamber'); introducing said synthesis gas into the said flame, thereby removing highly toxic pollutants in the waste being treated (para [0035] 'pyrolysis gases are combusted and the volatile organic compounds are substantially oxidized'); and carbonizing the waste materials (para [0027] 'pyrolysis of waste materials'; carbonization is the conversion of an organic substance into carbon or a carbon-containing residue through pyrolysis). But does not disclose allowing said superheated steam to react with a catalyst to generate hydrogen and oxygen gases and introducing said hydrogen and oxygen gases into the flame being used for heating said water such that the heating value of the heat being generated by said flame is increased. Barba does disclose introducing oxygen and other fuels to the flame (para [0028] 'an industrial fuel such as propane gas or natural gas. Air (oxygen) is supplied to the burner unit to support combustion'). It would have been obvious to one of ordinary skill in the art at the time of this invention to modify the method of Barba by using superheated steam as a source of hydrogen gas, produced using a catalyst, as opposed to propane or natural gas in order to reduce pollution (see US 4,490,349 A to Horvath col 1 ln 15-16 'environmental problems related to the production and consumption of fuels' col 1 ln 34-35 'Hydrogen is a non-pollutant fuel, and when burnt with air, it produces heat and steam'; col 3 ln 57-58 'in the presence of suitable catalysts').

As the shared technical features were known in the art at the time of the invention, they cannot be considered common technical features that would otherwise unify the groups. Therefore, Groups I-II lack unity under PCT Rule 13.