

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference AA 2207		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/FI2020/050226	International filing date (day/month/year) 07-04-2020	(Earliest) Priority Date (day/month/year) 08-04-2019
Applicant CARBOFEX OY		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☐ the international application in the language in which it was filed.
☒ a translation of the international application into English which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II).

3. ☐ **Unity of invention is lacking** (See Box No. III).

4. With regard to the **title**,

- ☐ the text is approved as submitted by the applicant.
☒ the text has been established by this Authority to read as follows:

Method and apparatus for the manufacturing of non-energent biocoal with thermal treatment.

5. With regard to the **abstract**,

- ☐ the text is approved as submitted by the applicant.
☒ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1
☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

The invention relates to a method and an apparatus for manufacturing, with thermal treatment, non-energent biocoal. Feedstock (x) is conveyed in a process space (2) with the conveyor arrangement (3), whereby a pyrolysis gas (y) is generated from the feedstock (x) present inside the conveyor arrangement (3) as a result of heat transfer from a combustion chamber (4). The amount of polycyclic aromatic hydrocarbons (PAHs) compounds contained in the non-energent biocoal (x') is reduced/eliminated by means of water vapour (z') by delivering water (z) into the interior of the conveyor arrangement (3).

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2020/050226

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: C10B, C10L

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2018039738 A1 (THE CRUCIBLE GROUP PTY LTD), 8 March 2018 (2018-03-08); figure 1; claim 3 --	1-8
A	EP 2072600 A2 (PISKORZ JAN ET AL), 24 June 2009 (2009-06-24); paragraph [0010]; figure 1 --	1-8
A	US 20140183022 A1 (DAUGAARD DAREN ET AL), 3 July 2014 (2014-07-03); paragraphs [0097]-[0099]; figures 2,3 --	1-8
A	US 20100228062 A1 (BABICKI MATTHEW L ET AL), 9 September 2010 (2010-09-09); paragraphs [0033], [0051] --	1-8

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"D" document cited by the applicant in the international application	"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
"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"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	

Date of the actual completion of the international search
06-07-2020

Date of mailing of the international search report
06-07-2020

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2020/050226

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	US 20190367814 A1 (BRANDHORST JR HENRY W ET AL), 5 December 2019 (2019-12-05); paragraphs [0048], [0063], [0070]-[0074], [0123], [0190]; claims 1, 10 --	1-8
A	Buss, W. et al., Strategies for producing biochars with minimum PAH contamination. Journal of Analytical and Applied Pyrolysis, 119, pp. 24-30, 6th June 2016; whole document --	1-8
A	Polycyclic aromatic hydrocarbons (PAHs) in biochar - Their formation, occurrence and analysis: A review, Congying Wang et al., Organic Geochemistry 114 (2017) 1-11; whole document -- -----	1-8

Continuation of: second sheet

International Patent Classification (IPC)

C10B 53/02 (2006.01)

C10B 7/10 (2006.01)

C10B 47/44 (2006.01)

C10B 49/04 (2006.01)

C10L 5/44 (2006.01)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2020/050226

WO	2018039738 A1	08/03/2018	AU	2017320469 A1	04/04/2019
			CA	3035101 A1	08/03/2018
			CN	110121543 A	13/08/2019
			EP	3507345 A1	10/07/2019
			US	20200010763 A1	09/01/2020
EP	2072600 A2	24/06/2009	BR	PI0804974 A2	04/05/2010
			CA	2639022 C	15/07/2014
			CN	101440026 B	03/08/2016
			DE	08164013 T1	21/01/2010
			ES	2329645 T1	30/11/2009
			US	20090126433 A1	21/05/2009
			US	8436120 B2	07/05/2013
US	20140183022 A1	03/07/2014	US	9909067 B2	06/03/2018
US	20100228062 A1	09/09/2010	CN	102341485 B	10/06/2015
			EP	2403926 A4	24/07/2013
			US	8541637 B2	24/09/2013
			WO	2010099626 A1	10/09/2010
US	20190367814 A1	05/12/2019	NONE		