

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43*bis*.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2018/053092

International filing date (day/month/year)
27.09.2018

Priority date (day/month/year)
29.09.2017

International Patent Classification (IPC) or both national classification and IPC
INV. C10G9/16 C10B43/02

Applicant
PRAXAIR TECHNOLOGY, INC.

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of this opinion

see form
PCT/ISA/210

Authorized Officer

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>5, 6, 13, 14</u>
	No: Claims	<u>1-4, 7-12</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-14</u>
Industrial applicability (IA)	Yes: Claims	<u>1-14</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1 JP H05 156261 A (NIPPON KOKAN KK) 22 June 1993
- D2 JP 2000 219883 A (NIPPON STEEL CORP) 8 August 2000
- D3 US 2014/060586 A1 (HILL REX A [US]) 6 March 2014

- 1 D1:JPH05156261 discloses a method of removing carbon attached to a carbonization chamber by blowing coke oven waste gas onto the carbon (claim 1), whereby the waste gas comprises 25% CO₂, 3% O₂ and 70% N₂ at a temperature of 150°C (§12).
 - 1.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 2, 4, 7, 8 and 9 is not new in the sense of **Article 33(2) PCT**.
- 2 D2:JP2000219883 discloses a method for removing carbon sticking in a coke oven comprising altering the gas pressure and/or flow rate by introducing an inert gas comprising CO₂ (claim 3). Furthermore, air is blown to the sticking carbon layers and/or mechanical shocks are given to the sticking carbon to readily remove it (claim 4).
 - 2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 2, 4 and 10-12 is not new in the sense of **Article 33(2) PCT**.
- 3 D3:US2014060586 discloses a method for removing coke deposits in radiant tubes of an olefin cracking furnace and removing accumulated spalled coke from one or more outlet elbows of the olefin cracking furnace without performing a cold shutdown of the furnace, the method comprising the steps of
 - (a) introducing decoking air and low pressure steam into a plurality of radiant tubes of the olefin cracking furnace, and maintaining flow through the plurality

of radiant tubes for a first period of time;

(b) identifying a first outlet elbow with restricted flow therethrough due to accumulated spalled coke resulting from step (a); and

(c) introducing medium pressure steam through a first subset of the plurality of radiant tubes, the first subset of tubes comprising (i) a plurality of tubes upstream of one or more outlet elbows through which flow is not restricted and (ii) a second subset of tubes upstream of the first outlet elbow identified in step (b) through which flow is restricted, and maintaining flow therethrough for a second period of time, thereby removing accumulated spalled coke from the first outlet elbow (claim 1).

D3 further discloses that the medium pressure steam is from about 300 psig to about 600 psig (claim 2).

3.1 D3 further discloses that oxygen from the air reacts with the carbon deposits on the interior surfaces of the furnace tubes to form carbon dioxide gas, which is exhausted from the furnace, typically, to atmosphere (§8).

The forming of the carbon dioxide gas inside the furnace tubes implicitly discloses exposing the furnace tubes to carbon dioxide gas.

3.2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-4 , 7-10 and 12 is not new in the sense of **Article 33(2) PCT**.

4 The additional features of dependent claims 5, 6, 13 and 14 do not show any unexpected technical effect and are merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed (**Article 33(3) PCT**).

The reasons therefor are that the additional features of the said claims are a combination of features obvious to the man skilled in the art in consideration of the disclosure of the prior art named in the present proceedings, or they concern only minor modifications which lie within the normal practice of the man skilled in the art.

Re Item VIII

Certain observations on the international application

- 5 Claim 13 is unclear as it is defined by a trademark process (**Article 6 PCT, Guidelines 5.39**).