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(54) **Title:** METHODS AND SYSTEMS FOR PRODUCING DIRECT REDUCED IRON INCORPORATING A CARBON DIOXIDE AND STEAM REFORMER FED BY RECOVERED CARBON DIOXIDE

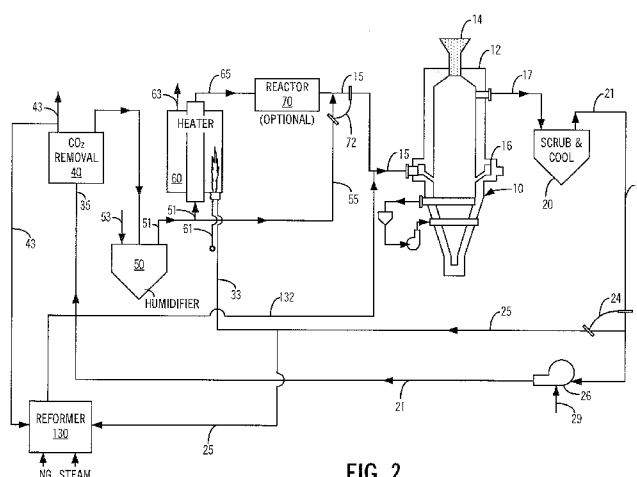


FIG. 2

(57) **Abstract:** Methods and systems for producing direct reduced iron (DRI), comprising: generating a syngas stream in a carbon dioxide (CO₂) and steam reformer; and providing the syngas stream to a direct reduction (DR) shaft furnace as a reducing gas stream. The methods and systems also comprise combining the syngas stream with a recycled off-gas stream from the DR shaft furnace to form the reducing gas stream. The methods and systems further comprise removing carbon dioxide (CO₂) from the recycled off-gas stream from the DR shaft furnace prior to combining it with the syngas stream to form the reducing gas stream. The methods and systems still further comprise feeding CO₂ removed from the recycled off-gas stream from the DR shaft furnace to the CO₂ and steam reformer. The methods and systems still further comprise feeding recycled off-gas from the recycled off-gas stream from the DR shaft furnace to the CO₂ and steam reformer.



INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C21B 11/02 (2016.01)

CPC - C21B 11/02 (2016.02)

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(8) - C01B 3/02; C21B 3/02, 11/02 (2016.01)

CPC - C01B 3/02; C21B 3/02, 11/02 (2016.02)

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

USPC - 75/392, 488; 252/373; IPC(8) - C01B 3/02; C21B 3/02, 11/02; CPC - C01B 3/02; C21B 3/02, 11/02 (keyword delimited)

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

Orbit, Google Patents, Google Scholar.

Search terms used: iron, syngas.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/0264177 A1 (MIDREX TECHNOLOGIES INC) 18 September 2014 (18.09.2014) entire document	1-7, 9, 12-18, 20
---		8, 10, 11, 19, 21, 22
Y	US 2013/0312571 A1 (MIDREX TECHNOLOGIES INC) 28 November 2013 (28.11.2013) entire document	8, 19
Y	US 2011/0247457 A1 (KNOP et al) 13 October 2011 (13.10.2011) entire document	10, 11, 21, 22
A	US 3,844,766 A (BEGGS) 29 October 1974 (29.10.1974) entire document	1-22



Further documents are listed in the continuation of Box C.



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"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

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"&" document member of the same patent family

Date of the actual completion of the international search

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