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With international search report.

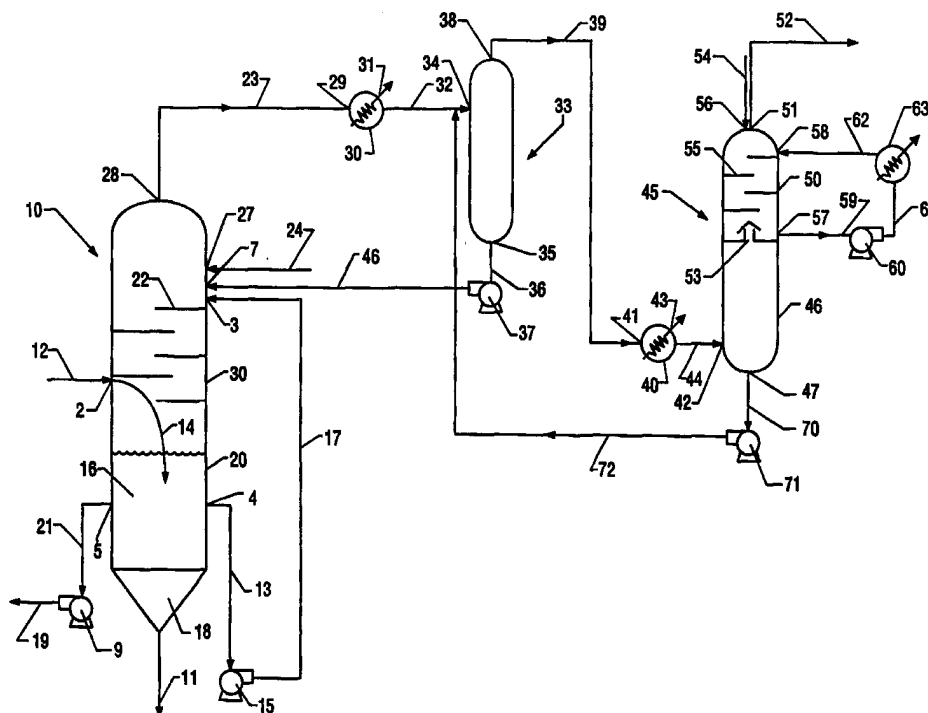
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(54) Title: SYSTEM FOR QUENCHING AND SCRUBBING AND COOLING AND WASHING HOT PARTIAL OXIDATION GAS

(57) Abstract

A system for quenching and scrubbing hot partial oxidation gas and washing and cooling hot partial oxidation gas is disclosed. During the quenching and scrubbing phase, removal of particulate contaminants is facilitated by using a high pressure settler assembly in combination with a scrubbing tower (10). Preferably, the high pressure settler consists of a sump (18) internal to the scrubbing tower or a sump and quiet zone combination that is internal to the scrubbing tower. Use of the high pressure settler allows for increased settling rates and increased scrubbing efficiency. During the cooling and washing, a knockout drum (45) having an integral washing system is

advantageously employed. Use of the knockout drum during the condensing and washing phase of gasification process facilitates removal of ammonia and water vapor from a partial oxidation gas containing water vapor and ammonia. The knockout drum (35) comprises a bottom section (46) and top section (50) with a transfer means (53) connecting the bottom section to the top section. The top section comprises a series of trays (55) capable of channeling water from the upper end of the top section to the lower end of the top section. The transfer means provides unidirectional flow of a fluid from the bottom section to the top section.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/11744

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B01D47/02 B01D47/12 B01D53/18 C10K1/08 C10J3/84
C10K1/04

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 6 B01D C10K C10J

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 025 453 A (TEXACO DEVELOPMENT CORP) 23 January 1980 see claim 1 ---	1-16
A	US 4 392 981 A (CORBEELS ROGER J ET AL) 12 July 1983 see column 1, line 49 - line 63; claim 1 ---	1-16
A	US 4 705 542 A (GILMER WILLIAM N) 10 November 1987 see figure 1 ---	1-16
A	US 4 001 116 A (SELCUKOGLU YUKSEL ALI) 4 January 1977 see figure --- -/-	1-9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *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.
- *Z* document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Intern. Appl. Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 721 516 A (BARSACQ GABRIEL) 26 January 1988 see figure 2 ---	1-9
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A	US 3 681 897 A (MITCHELL NORRIS W ET AL) 8 August 1972 see column 5, line 9 - column 7, line 15; figure ---	17-28
A	EP 0 603 997 A (TEXACO DEVELOPMENT CORP) 29 June 1994 see figure 1 ---	17-28
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A	GB 2 125 429 A (HUMPHREYS & GLASGOW LTD) 7 March 1984 see figure ---	17-28
A	DE 21 66 280 A (METALLGESELLSCHAFT AG) 26 July 1973 see figure 1 ---	17-28
A	GB 1 244 176 A (IRVINE ROBERT LEARD) 25 August 1971 see figure -----	17-28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 98/11744

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

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 an additional fee, this Authority did not invite payment of any additional fee.
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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-16

Scrubbing tower and high pressure settler assembly comprising a dip tube, a bottom portion with a water content, a top portion and a high pressure settler and a process for removing particulates from partial oxidation gas containing particles.

2. Claims: 17-26

A knockout drum, a cooling and washing apparatus comprising a series of heat exchangers and a knockout drum having an integral washing system and a process for condensing and washing partial oxidation gas containing water vapor and ammonia comprising forcing the partial oxidation gas through one or more heat exchangers and then forcing the gas through one or more knockout drums, the knockout drums comprising a bottom section with inlets and outlets, a top section with inlets, outlets, trays and a transfer means for unidirectional flow from the bottom portion to the top portion.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern. Appl. Application No

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