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(54) Title: HYBRID AIR SEPERATION METHOD WITH NONCRYOGENIC PRELIMINARY ENRICHMENT AND CRYOGENIC PURIFICATION BASED ON A SINGLE COMPONENT GAS OR LIQUID GENERATOR

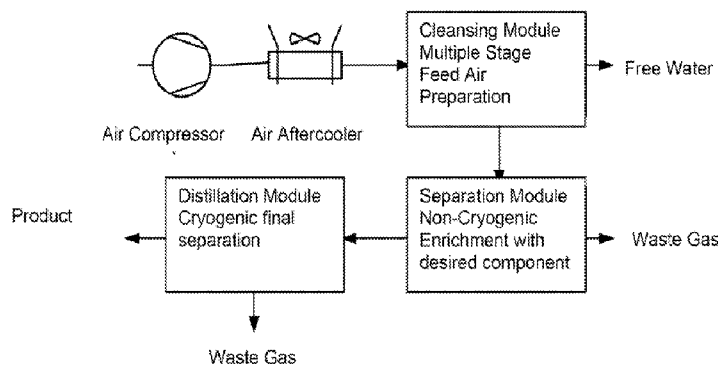


Figure 1

(57) Abstract: Large quantities of high purity and high pressure nitrogen or oxygen gas are produced using a portable system. A PSA, VSA, TSA, or permeable membrane system cleans the air of water and carbon dioxide, as normally required by the cryogenic distillation cycle, but additionally, a significant amount of the oxygen or nitrogen is also removed, depending on the desired produced gas. The removal of the oxygen or nitrogen before the cryogenic process permits the distillation column to be significantly shorter than would otherwise be required. This in turn reduces the size of the equipment such that it can easily be transported and setup. Additionally, a high pressure liquid pump is used to boost the pressure of the nitrogen or oxygen immediately before it goes through the last pass of the cryogenic heat exchanger where the liquid is vaporized and the incoming gas is cooled.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/047850**A. CLASSIFICATION OF SUBJECT MATTER****B01D 53/26(2006.01)i, B01D 53/02(2006.01)i**

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 as above

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

Korean Utility models and applications for Utility models
Japanese Utility models and applications for Utility models

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

eKOMPASS(KIPO internal)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,732,580 A (JAIN et al.) 1988.03.22 See abstract, figure 1, column 1, lines 56-62, column 2, lines 1-13 and lines 51-64, claims 1 and 24	1-9, 11-26
A	US 4,957,523 A (ZARATE et al.) 1990.09.18 See abstract, figure 1, column 3, lines 23-30, column 10, lines 27-29, claim 1	1-9, 11-26
A	US 4,934,148 A (PRASAD et al.) 1990.06.19 See abstract, figures 1-2, column 3, line 53 to column 4, line 3, claims 1 and 9	1-9, 11-26
A	US 5,116,396 A (PRASAD et al.) 1992.05.26 See abstract, figures 1-2, column 3, line 61 to column 4, line 12, column 4, lines 58-66	1-9, 11-26
A	US 4,595,405 A (AGRAWAL et al.) 1986.06.17 See abstract, figure 1, column 3, line 43 to column 4, line 2, column 4, lines 30-33	1-9, 11-26

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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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