

Title (en)
Process and apparatus for air separation by cryogenic distillation

Title (de)
Verfahren und Vorrichtung zur kryogenischen Luftzerlegung

Title (fr)
Procédé et installation de séparation d'air par distillation cryogénique

Publication
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Application
EP 01400413 A 20010216

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Abstract (en)
Air is compressed, purified and sent (7, 9) to sections of a first column, to be separated at cryogenic temperatures. At least part of a fraction (25) containing at most 30 mole% of oxygen extracted from the column, is sent for compression (21); the compressor inlet temperature being below ambient. At least part of the fraction compressed, is cooled and condensed, simultaneously vaporizing an internal fluid or extract from the first column, possibly after nitrogen enrichment. A liquid fraction (33) rich in oxygen is extracted from the first column, and pressurized to exceed column (17) pressure. It is vaporized by direct or indirect heat exchange with part of the air (7, 9) feed, to form a gaseous product under pressure, which is rich in oxygen. An Independent claim is included for the corresponding plant, in which the pressurized liquid is vaporized by heat exchange in direct or indirect mode. In the case of direct heat exchange, this is made with air (9) sent to the first column. Preferred features: The compressed fraction (25) contains at most 19 mole% of oxygen and at least 81 mole% of nitrogen. At least part (7) of the air is let down in a turbine (15) before sending it to the first column. Work output in this stage, partially compresses the fraction containing at least 30% of oxygen in one or more stages of compression. At least a part of the air (9) is compressed to high pressure, condensed and sent to the first column. A fraction of the air which is not let down, is condensed, simultaneously vaporizing an internal fluid or material extracted from the first column. Further variants based on the foregoing principles are described. At least a fraction of the air sent to a column of the plant, comes from the compressor of a gas turbine and/or a gas enriched with nitrogen from the first column is returned to the gas turbine system. The inlet pressure of the gas turbine exceeds 15 bar absolute. The inlet temperature of the cold compressor (21) is below -100 to -150 degrees C. The final product is liquid or otherwise. The compressed fraction condenses at least partially in the internal reboiler (19) of the first column. The fraction compressed becomes enriched in nitrogen in a second distillation column connected for heat exchange, with the first.

Abstract (fr)
Une installation de séparation d'air produisant de l'oxygène gazeux sous pression comprend au moins une colonne (17) ayant un rebouilleur de cuve (19) et alimentée par un débit d'air. Le rebouilleur de cuve est chauffé par un gaz enrichi en azote (25) comprimé dans un compresseur froid (21) et de l'oxygène liquide (33) pompé est soutiré en cuve de la colonne, pompé et vaporisé. Les frigories pour le procédé sont produites par détente d'air dans une turbine (15). <IMAGE>

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Citation (search report)
• [XA] EP 0589646 A1 19940330 - AIR PROD & CHEM [US]
• [A] EP 0810412 A2 19971203 - TEISAN KK [JP]
• [A] US 5596885 A 19970128 - GRENIER MAURICE [FR]
• [A] US 3392536 A 19680716 - SMITH DONALD L
• [DA] DE 1199293 B 19650826 - LINDE EISMASCH AG

Cited by
CN101922848A; WO2012155318A1

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