

AbstractProcess and apparatus for cryogenic air separation

5 The process and the apparatus are used for the cryogenic separation of air in a distillation column system which has at least one single column (12). A compressed feed air stream (6, 8) is cooled in a main heat exchanger (9) in counter-current to a first return stream (16, 23) from the distillation column system. The cooled feed air stream (11) is led into the distillation column system. A nitrogen-rich fraction (15) is
10 produced in the upper region of the single column (12). At least part (16b) of the nitrogen-rich fraction (15) is condensed in a top condenser (13), which is constructed as a condenser-evaporator. At least part (54) of the liquid nitrogen-rich fraction (52) produced in the top condenser (13) is led into the single column (12) as reflux. An oxygen-containing recycle fraction (18a) is drawn off from the single column (12) in
15 liquid form. The liquid recycle fraction (18a) is cooled in a counter-current subcooler (100). The cooled recycle fraction (18b) is evaporated in the top condenser (13). The evaporated recycle fraction (29) is re-compressed in a re-compressor (30). The re-compressed recycle fraction (31, 32) is fed to the lower region of the single column (12). The main heat exchanger (9) and the counter-current subcooler (100) are formed
20 by an integrated heat exchanger (102). The integrated heat exchanger (102) has a first group of passages for the first return stream (16, 23), which goes through from the cold to the warm end of the integrated heat exchanger. The first return stream (16, 23) is led into this group of passages at the cold end and flows through the integrated heat exchanger (102) as far as its warm end and, in the process, is brought into indirect
25 heat exchange both with the liquid recycle fraction (18a) and with the feed air stream (8).

(Drawing)