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Datasheet for the decision of 19 February 2009

Case Number: T 1377/06 - 3.2.03

Application Number: 97916570.1

Publication Number: 0897519

IPC: F25J 3/04, F27D 17/00

Language of the proceedings: EN

Title of invention:
Air separation apparatus

Patentee:
The BOC Group Limited

Opponent:
L'AIR LIQUIDE, S.A.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84, 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Novelty (yes)"
"Inventive step (no)"
"Lack of support in the description"

Decisions cited:
-

Catchword:
-

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Case Number: T 1377/06 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 19 February 2009

Appellant: (Opponent)
L'AIR LIQUIDE, S.A. A DIRECTOIRE ET CONSEIL DE SURVEILLANCE POUR L'ETUDE ET L'EXPLOITATION DES PROCEDES GEORGES CLAUDE
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 4 July 2006 rejecting the opposition filed against European patent No. 0897519 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: J.-P. Seitz
Members: C. Donnelly
Y. Jest

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division, posted on 4 July 2006, rejecting the opposition against European Patent EP-B-897519.

II. The opponent (hereinafter "the appellant") filed a notice of appeal on 25 August 2006 requesting that the impugned decision be set aside and the patent revoked. The appeal fee was paid the same day. In the grounds of appeal filed on 14 November 2006 the appellant laid out its case in support of the above requests and cited the following documents:

D1 - EP-A-689019;
D2 - EP-A-653599;
D3 - EP-A-50402;
D4 - EP-A-438282;
D5 - Brochure "VK/HVK Integrally Geared Centrifugal Compressors", February 1995, Mannesmann;
D6 - FR-A-2590494;
D7 - GB-A-2283562;
D8 - "Energy efficiency in the Provision and Use of Industrial Gases" 1994, Good Practice Guide series No. 90, prepared for the Energy Efficiency Office by ETSU Hartwell, Oxfordshire, Table of Contents and page 21 ;
D9 - JP-A-59212676 and English translation;
D10 - JP-A-63197869 and English translation;
D11 - GB-A-730126.

III. In its letter of 11 May 2007 the patentee (hereinafter: "respondent") requested that the appeal be dismissed or alternatively that the patent be maintained in amended

form on the basis of one of auxiliary requests 1 to 3 submitted with letter of 26 November 2003.

In its letter of 17 February 2009 the respondent informed the Board that it had changed its name from "The BOC Group plc" to "The BOC Group Limited" and sent a copy of the certificate giving proof of this change.

IV. Both parties made auxiliary requests for oral proceedings to be held.

In a communication dated 2 October 2008 pursuant to Article 15(1) RPBA annexed to the summons to oral proceedings, the Board informed the parties of its provisional opinion. In particular, the Board indicated that the subject-matter of claim 1 as granted appeared to be new.

Oral proceedings before the Board were held on 19 February 2009.

In reaction to an objection under Article 123(2) EPC which came to light for the first time during the oral proceedings the respondent made use of the occasion accorded to it by the Board to file amended second and third auxiliary requests to replace those on file.

V. Claim 1 as granted reads:

"An air separation apparatus comprising a compressor (2) having at least two stages (4,6,8,10) in series, a first outlet (16) from a chosen stage upstream of a final stage (10) of the compressor (2), a second outlet (40) from the final stage (10) of the compressor (2),

an air purifier (18) having an inlet communicating with the first outlet (16) and an outlet communicating with first and second flow paths (26,36) in parallel with one another, wherein the first flow path (26) leads via a heat exchanger (28) to at least one rectification column (30) for separating the air, there being an outlet (32) for a nitrogen product from the said rectification column (30), the second flow path (36) leads via the stage or stages (10) downstream of said chosen stage (8) to the second outlet (40), and the second outlet (40) provides an outlet from the apparatus for a purified air product.".

In claim 1 according to the first auxiliary request the following feature is added to claim 1 as granted:

"and the air purifier (18) is effective to remove water vapour, carbon dioxide, and one or both of hydrogen and carbon monoxide impurities from the air."

Claim 1 according to the second auxiliary request reads as follows (amendments indicated in italics):

A combination of an electronics plant and an air separation apparatus, the air separation apparatus comprising a compressor (2) having at least two stages (4,6,8,10) in series, a first outlet (16) from a chosen stage upstream of a final stage (10) of the compressor (2), a second outlet (40) from the final stage (10) of the compressor (2), an air purifier (18) having an inlet communicating with the first outlet (16) and an outlet communicating with first and second flow paths (26,36) in parallel with one another, wherein the first flow path (26) leads via a heat exchanger (28) to at

least one rectification column (30) for separating the air, there being an outlet (32) for a nitrogen product from the said rectification column (30), the second flow path (36) leads via the stage or stages (10) downstream of said chosen stage (8) to the second outlet (40), and the second outlet (40) provides an outlet from the apparatus for a purified air product, *the second outlet (40) and the outlet (32) for a nitrogen product being adapted to supply separate pure air and pure nitrogen products to the electronics plant.".*

In claim 1 according to the third auxiliary request the following feature is added to claim 1 according to the second auxiliary request:

"and in which the air purifier (18) is effective to remove water vapour, carbon dioxide, and one or both of hydrogen and carbon monoxide impurities from the air."

VI. The arguments of the parties relevant to the decision can be summarised as follows:

(a) *Main request - Claim 1 as granted.*

Appellant

(i) Novelty

The subject-matter of claim 1 as granted is not new in the light of D1.

This document describes an air separation apparatus comprising a compressor (1) having at least two stages

(n) (see column 4, lines 23 to 24) in series, a first outlet from a chosen stage (p) upstream of a final stage of the compressor (1), a second outlet from the final stage (n) of the compressor (1), an air purifier (2A) having an inlet communicating with the first outlet and an outlet communicating with first and second flow paths (see figure 1) in parallel with one another, wherein the first flow path leads via a heat exchanger (6) to at least one rectification column (8) for separating the air, there being an outlet (26) for a nitrogen product from the said rectification column (8), the second flow path leads via the stage or stages (p+1 - see column 4, lines 37 to 42) downstream of said chosen stage (p) to the second outlet.

However, D1 also describes an apparatus wherein the second outlet provides an outlet from the apparatus for a purified air product since the air exiting the nth stage of the compressor 1 constitutes a product of the apparatus in that a product of the apparatus does not necessarily have to be exported from the apparatus, but may be present in the apparatus as part of its operation.

(ii) Inventive step.

Claim 1 as granted lacks an inventive step in view of a combination of the teachings of D1 and D8.

D1 is the nearest prior art since this document describes an air separation apparatus of the same type as that disclosed in the contested patent. Since it also has the most features in common there can also be

no doubt that it is the most promising spring-board to arrive at the subject-matter of claim 1.

The only possible distinguishing feature that can be recognised in the subject-matter of claim 1 is that the second outlet provides an outlet from the apparatus for a purified air product.

This distinguishing feature solves the problem of supplying a client with purified air.

D8 describes the general knowledge of the skilled person in 1994. From the contents listing, in particular section 2.1 "Cryogenic Air Separation Plants" there can be no doubt that the document was intended as a source of reference for engineers active in the field of air separation seeking to reduce energy costs. At section 5.1 it teaches that a centralised air compression facility can potentially be designed to supply plant air, instrument air, instrument air back-up and a compressed air supply to an on-site gas generator. For the particular case of cryogenic air-separation unit it further suggests that the sieve adsorbers of the cryogenic plant could be used as dryers for plant and instrument air provided to a client.

Thus, D8 teaches the skilled person faced with the problem of supplying a client with purified air to use the purifying capability of the air-separation unit to this end. The pressure at which the purified air is supplied is determined entirely by the use to which the purified air is to be put. Hence, providing an outlet from the final stage of the compressor for a purified

air product would not require any inventive activity on the part of the skilled person since the outlet position is merely a function of the circumstances to which the purified air is to be used.

Further, the present wording of claim 1 is not restricted to a compressor with a single shaft and motor since these are not specified. Thus, the compressor 5 of D1 could very well be considered to be the last stage of the compression system.

Respondent

(i) *Novelty*

The outlet at the final stage of the compressor in D1 does not provide an outlet for a purified air product since it leads uniquely to the air-separation unit. Purified air exiting the final stage of the compressor which is then fed into the air-separation unit does not constitute a "product" in itself since it is actually processed into another product e.g. pure nitrogen.

Thus, the subject-matter of claim 1 as granted is new.

(ii) Inventive step

It is incorrect to take D1 as the nearest prior art since this document does not show a high-pressure purified air take-off. For this reason the skilled person would see that D2 is more pertinent and consider it to provide a more promising spring-board to the invention. Even if D1 were to be taken as the most relevant art then the skilled person would make the

take-off point for the purified after the compressor 5 since it is well known in the art that it is always better to take a supply at the highest pressure in order to meet possible future increases in pressure requirments and because it is simpler to decrease the pressure in a supply line rather than increase it.

The claim clearly specifies "a compressor having at least two stages in series" and "the final stage of the compressor". Thus, there can be no doubt that only a single multi-stage compressor is under consideration. Accordingly, the compressor 5 in D1 cannot be considered to be the final stage of the compressor since it is a separate machine. Hence, a take-off point for the purified air situated at this point does not anticipate the claim.

D8 does nothing more than reinforce this teaching since it advocates the use of a single compression system to supply a plurality of users. Thus, all users would receive an air supply at the highest pressure provided by the compression system and expand down to meet their individual requirements.

Thus, a combination of D1 and D8 cannot lead to the claimed subject-matter since there is no teaching in either document to provide a take-off point at the final stage of the compressor. On the contrary, the teaching of D2 and D8 is that even if the skilled person were to come up with the idea of modifying D1 without the benefit of hindsight in order to provide a supply a purified air he would make the take-off a the point of highest pressure i.e. after the booster compressor 5. D2, which is the only document actually

showing take-off points for purified air, reinforces this point of view since both of the lines 34 and 35 are situated after the downstream compressor 29.

(b) *First Auxiliary request - Inventive step*

Appellant

The additional feature merely lists the impurities that the air-purifying equipment in the air-separation unit should be capable of removing. The skilled person would receive such a specification from the client for both the purified air and the nitrogen product. If the skilled person required any specific teaching to the effect that air-purifying equipment used in air separation unit can be used to remove such impurities he need look no further than the abstract of D4.

Thus, the subject-matter of claim 1 does not meet the requirements of Article 56 EPC.

Respondent

This feature should not just be seen in terms of which impurities are removed but also take into account where they are removed. Normally the feed air entering the air-separation unit would be subject only to removal of water vapour (i.e. drying) and carbon dioxide but not of all the impurities listed. Also, separate facilities would be provided for each of the purified air and nitrogen product streams since they would normally be subject to differing purity requirements. By purifying all of the air there is no need for separate facilities and the amount of air entering the air-separation plant

or being bled off for supply as purified air can be varied as required.

(c) *Second and third auxiliary requests-*

Appellant

(i) Article 84 EPC

The only mention in the application as filed of an "electronics plant" is in the paragraph corresponding to that of published patent specification at column 2, line 47. This term is unclear since it gives no indication as to exactly what kind of plant is under consideration. Thus, the requirements of Article 84 EPC are not met for this reason alone. Further, the description of the contested patent gives no indication as to how the claimed combination should be realised. Thus, the claim is not supported by the description which is also a breach of Article 84 EPC.

(*ii) Article 123(2) EPC*

Both of these requests are now directed at a combination of an electronics plant and an air separation apparatus. Such a combination is not originally disclosed. Paragraph [0001] states that the invention "relates to an air separation apparatus" and paragraph [0004] just states that "there is often a need to supply to the same manufacturer of electronics components separate pure air and pure nitrogen products." There is no mention any where of how the supply itself is realised, it could well be that each of the products is prepared at an air-separation unit

some distance from the electronics plant and transported there by tanker.

Respondent

(i) Article 84 EPC

The term "electronics plant" is clear in the context of of the patent since it can only refer to plants in which a supply of purified air and pure nitrogen would be used, as indicated at paragraph [0004] of the patent, i.e. a manufacturer of electronics components requiring such products. The skilled person would have no difficulty in realising how the air separation unit could be combined with such a plant. Indeed, an indication is given by referring to a take-off point which hints that there is a pipe leading to the electronics plant, however, other variations with the two plants being separated by more or less greater distances are not to be excluded. Thus, there is no need for a more detailed explanation in the description in order to meet the requirements of Article 84 EPC.

(ii) Article 123(2) EPC

A combination of the air-separation unit and the electronics plant is supported by paragraph [0004] which states that "there is a need to supply to the same manufacturer of electronics components separate pure air and pure nitrogen products". Since the air separation unit is for supplying both products it is obvious that it is dedicated to the electronics plant and therefore combined with it.

Reasons for the Decision

1. *Main Request*

1.1 *Novelty*

Only document D1 has been cited as novelty destroying by the appellant. In the Board's view this document, see in particular figure 1, describes:

an air separation apparatus comprising a compressor (1) having at least two stages (n) (see column 4, lines 23 to 24) in series, a first outlet from a chosen stage (p) upstream of a final stage of the compressor (1), a second outlet from the final stage (n) of the compressor (1), an air purifier (2A) having an inlet communicating with the first outlet and an outlet communicating with first and second flow paths (see figure 1) in parallel with one another, wherein the first flow path leads via a heat exchanger (6) to at least one rectification column (8) for separating the air, there being an outlet (26) for a nitrogen product from the said rectification column (8) the second flow path leads via the stage or stages (p+1 - see column 4, lines 37 to 42) downstream of said chosen stage (p) to the second outlet.

The subject-matter of claim 1 differs therefrom in that the second outlet provides an outlet from the apparatus for a purified air product.

The appellant's argument that D1 also describes an apparatus wherein the second outlet provides an outlet from the apparatus for a purified air product is not

convincing. By using the term "product" the claim makes it clear that the purified air exiting the final stage of the compressor 1 must necessarily be exported from the apparatus for exploitation as a product and that an outlet must be provided in the apparatus to this effect. An outlet leading uniquely to the air-separation unit does not meet this requirement. Purified air exiting the final stage of the compressor where there is no provision of an outlet from the apparatus and which is consequently fed into the air-separation unit does not constitute a "product" since it is not available for use, but rather is further processed into another product e.g. pure nitrogen.

Thus, the subject-matter of claim 1 as granted meets the requirements of Article 54 EPC.

1.2 *Inventive step*

Paragraph [0004] of the contested patent indicates that prior to the contested patent in order to supply a single client with purified air and pure nitrogen, separate apparatuses were used. Thus, it is logical that the skilled person would as a first step have considered each of these separate apparatuses when contemplating any improvements since they went to make up the conventional plant used to accomplish the basic task of supplying both types of gas. It is also clear that attention would have focussed on the available air-separation units since this is the only one of the two capable of providing pure nitrogen.

For these reasons the Board is of the opinion that D1 is the nearest prior art since it discloses a cryogenic

air separation facility with a multi-stage air-compressor and air-purifiers of the type under consideration. The respondent has argued that D2 should be taken as the nearest prior art since this document is the only one to show an air-separation unit which supplies both a compressed purified air product and a pure nitrogen product and therefore would have been considered the most promising spring-board to the invention. However, the respondent then went on to show that the skilled person would have fallen short and not arrived at the subject-matter of claim 1 in an obvious manner. Since the appellant has chosen to launch its attack from D1, the Board sees no point in engaging in what could be a mere academic exercise of analysing the relative merits of the respondent's attempt at an own-goal, if the appellant's attack is anyway successful and which in itself would be proof of D1's promising spring-board status.

The distinguishing feature with respect to D1 identified above during the analysis of novelty has the technical effect of allowing a single apparatus to supply both purified air and pure nitrogen.

The objective technical problem can therefore be seen as one of providing a supply of purified air and pure nitogen in a more economical manner.

D8 relates to the "Energy efficiency in the provision and use of industrial gases" and was intended to be read by engineers in the cryogenic air-separation industry seeking advice on energy saving techniques. Although it does not describe any particular type of apparatus, it suggests at section 5.1 that a

centralised air compression facility can potentially be designed to supply plant air, instrument air, instrument air back-up and a compressed air supply to an on-site gas generator. Moreover, it also suggests that the sieve adsorbers of the cryogenic plant could be used as dryers for plant and instrument air.

Hence, the skilled person is given a direct hint that the purified air from air-separation apparatus such as that described in D1 could be bled off and used for other purposes.

Therefore, the only issue to be addressed by the skilled person is that of where the take-off point for the purified air should be made.

The appellant has argued that the pressure at which the purified air is supplied and, hence, also the take-off point, would be determined entirely by the use to which it is intended to put the purified air.

On the other hand the respondent has argued that the skilled person would always select the highest pressure available to cover eventual changes in specification. Thus, even if the skilled person were to decide to bleed off air from D1, the take-off point would be situated after the compressor 5.

The appellant has countered that providing the take-off point after the compressor 5 would in any case fall within the scope of the claim since the compressor type is not exclusively limited to a single machine, but rather a system. During the oral proceedings, the respondent conceded that the present wording of the

claim does not exclude the possibility of a booster compressor positioned after the outlet from the final stage of the multi-stage compressor.

In the Board's view, the take-off point for the purified air would be determined to a large extent by the use to which it is intended to put the air. This is supported by D2, which shows two take-off points: i.e. purified air line 34 at medium pressure or, alternatively, line 35 at high pressure. Thus, the only document explicitly showing a purified air product supply from an air-separation unit indicates that the highest pressure is not systematically used.

The skilled person considering the apparatus according to D1 would see that after passing through the purifiers 2A, 2B purified air could potentially be tapped from several points of the system. However, according to the intended use, the relative advantages of each take-off point would be easily anticipated by the skilled person applying general knowledge of air-separation processes and compressor energy requirements.

A take-off point anywhere between the outlet 2 of the compressor and the inlet to the air-separation would anyway fall within the scope of the claim since further pressure modifying devices after the outlet from the final stage of the compressor 1 are not excluded by the wording of claim 1.

Therefore, the subject-matter of claim 1 as granted does not meet the requirements of Article 56 EPC.

2. *First Auxiliary request*

2.1 *Inventive step*

The additional feature added to claim 1 as granted to form the first auxiliary request identifies the impurities that the air-purifying equipment in the air-separation unit should be effective at removing. This feature solves the separate and additional objective technical problem of meeting the product purity specification for both gases.

The Board is of the opinion that such a specification would be provided directly by the client as a function of the uses to which it is intended to put both the purified air and the nitrogen product as a basic part of the supply contract. The removal of such impurities in air-separation plants is conventional and is described for example in the abstract of D4. The advantages of using a single purification apparatus in the air-separation apparatus to purify all the air are immediately apparent in terms of capital cost reductions and energy requirements. Indeed these advantages are suggested by D8 and there is no reason for the skilled person to diverge from this philosophy of simplification once it has been decided that the purifiers of the air separation plant should be used to provide the purified air.

3. *Second and third auxiliary requests-*

3.1 *Article 84 EPC*

The term "electronics plant" gives no indication as to exactly what kind of plant is under consideration, it could equally as well be a final assembly line for electronic goods, such as televisions, as a plant for manufacturing electronic components. Indeed, the term "electronics plant" is only mentioned once in the application documents at the paragraph corresponding to that of published patent specification at column 2, line 47. The provision of purified air and pure nitrogen does not permit the identification of the "electronics plant" to any great degree since the uses of these gases are varied and do not necessarily have to be of fundamental importance. The contested patent fails to give even one example of the use that the gases are intended for. The description of the contested patent gives no indication as to how the claimed combination between the "electronics plant" and the air-separation unit should be realised, where the limits of such "a combination" might lie and is devoid of any example of such a combination. Although, broad terminology in claims in itself is not automatically objectionable, the Board is of the opinion that in this case that the mark has been overstepped since the scope of the claim is broader than is justified by the extent of the description and drawings and in particular the contribution to the art. In conclusion, the subject-matter of claim 1 according to the second and third auxiliary requests is not supported by the description and does not meet the requirements of Article 84 EPC.

Thus, the requirements of Article 84 EPC are not met.

3.2 *Article 123(2) EPC*

Both requests are directed at a combination of an electronics plant and an air separation apparatus. However, the opening paragraph of the published application (corresponds to paragraph [0001] of the contested patent] states that the invention "relates to an air separation apparatus" whereas the fourth paragraph (corresponds to paragraph [0004] of the contested patent), cited by the respondent as the basis for introducing the amendment, states that "there is often a need to supply to the same manufacturer of electronics components separate pure air and pure nitrogen products." There is no explicit example of how the supply itself is realised other than indicating the take-off points for the purified air and pure nitrogen in the air separation plant. As indicated by the appellant, it could be that each of these products is prepared at an air-separation unit some distance from the "electronics plant" and transported there by tanker or other container. Further, there is no disclosure of bringing together in whatever manner of an air-separation plant for supplying purified air and pure nitrogen and an "electronics plant". The patent and its application do not disclose a combination of these two industrial plants, at least when construing "combination" a as meaning the air is supplied in someway directly from the air-separation plant to the electronics plant.

Thus, the requirements of Article 123(2) EPC are not met.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

Registrar Chairman

A. Counillon J.-P. Seitz