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**Datasheet for the decision
of 4 February 2010**

Case Number: T 0764/08 - 3.2.01

Application Number: 03014159.2

Publication Number: 1375349

IPC: B64D 37/32

Language of the proceedings: EN

Title of invention:
Oxygen/inert gas generator

Patentee:
CARLETON LIFE SUPPORT SYSTEMS INC.

Opponent:
L'AIR LIQUIDE, S.A. à directoire et conseil de surveillance
pour l'étude et l'exploitation des procédés Georges Claude

Headword:
-

Relevant legal provisions:
RPBA Art. 12(4)

Relevant legal provisions (EPC 1973):
EPC Art. 56, 114(2)

Keyword:
"Late submitted material (no) admitted (yes)"
"Inventive step - no (also after amendment)"

Decisions cited:
-

Catchword:
-



Case Number: T 0764/08 - 3.2.01

DECISION
of the Technical Board of Appeal 3.2.01
of 4 February 2010

Appellant:
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Respondent:
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 28 January 2008
revoking European patent No. 1375349 pursuant
to Article 101(2) EPC.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
G. Weiss

Summary of Facts and Submissions

I. The appeal is directed against the decision posted 28 January 2008 revoking European patent No. 1 375 349. The opposition division found that the subject-matter of claim 1 as granted did not involve an inventive step in the light of a closest state of the art which it considered to be acknowledged in the description of the patent specification, in combination with:

D6: US-B-6 319 305.

II. In its statement setting out the grounds of appeal the appellant (patent proprietor) contested the opposition division's view of the closest state of the art, in response to which the respondent (opponent) submitted *inter alia*:

D7: T. Reynolds "*Gas separation technology: state of the art*", Halon Operations Technical Working Conference, 24-26 April 2001, 51-63.

III. In an annex to a summons to oral proceedings the board raised a question concerning the extent of the general technical knowledge of the skilled person, in reply to which the respondent submitted:

D9: WO-A-00/00389.

IV. The respondent requested in a letter of 2 October 2008 that the appeal be dismissed. It did not participate in oral proceedings on 4 February 2010 at which the appellant requested that the contested decision be set aside and the patent be maintained as granted (main

request) or in the alternative that it be maintained in amended form on the basis of claims 1 to 23 filed during the oral proceedings (auxiliary request).

V. Claim 1 according to the appellant's main request reads:

"A gas generator system comprising:
at least one On Board Oxygen Generating System -OBOGS- (170, 180, 190) arranged to receive an air input and generate oxygen therefrom; and
at least one On Board Inert Gas Generating System -OBIGGS- (130, 140) arranged to receive an air input and generate an inert gas therefrom;
wherein a waste gas output of said at least one OBOGS is used to selectively supply an auxiliary supply of inert gas."

Claim 1 according to the appellant's auxiliary request reads:

"A gas generator system comprising:
at least one On Board Oxygen Generating System -OBOGS- (170, 180, 190) arranged to receive an air input and generate oxygen therefrom; and
at least one On Board Inert Gas Generating System -OBIGGS- (130, 140) arranged to receive an air input and generate an inert gas therefrom;
wherein at least one of said at least one On Board Oxygen Generating System (OBOGS) and at least one of said On Board Inert Gas Generating System (OBIGGS) share a common air input (100); and
a first control valve (160) and a second control valve (250), said first control valve selectively supplying a waste gas output of said at least one OBOGS to either

the atmosphere or to said second control valve, and said second control valve selectively supplying said waste gas output of said at least one OBOGS as an auxiliary supply of inert gas to either of two locations."

VI. The appellant's submissions as regards inventive step may be summarised as follows:

The opposition division was wrong to find that the subject-matter of claim 1 according to the main request was obvious in the light of a combination of state of the art acknowledged in the patent specification and the teaching of D6. Paragraph [0005] of the patent specification merely explains the state of the art whilst the content of paragraphs [0006] and [0007] reflect thoughts of the inventor which led to the present invention. They do not acknowledge that a parallel arrangement of OBOGS and OBIGGS was already known. Furthermore, the use of the waste gas output for supply to the fuel tanks in accordance with D6 is inseparably linked to the arrangement of OBOGS and OBIGGS in series. D7 is late-filed and should be disregarded but anyway discloses that the OBOGS/OBIGGS generators in a V-22 aircraft were operable only alternately and therefore were not arranged in parallel.

As regards the auxiliary request the common air input reduces the size and number of parts, requiring only one each of a heat-exchanger and filter/water separator. Such a common inlet is not known from D7. The combination of the two valves enables full choice of the operation of the system. Nothing in the state of the art suggests such an arrangement.

VII. The respondent countered essentially as follows:

The patent specification states in paragraphs [0005] to [0007] that a parallel arrangement of OBOGS and OBIGGS was already known. Since the appellant now disputes this D7 is filed as evidence to this effect. It is filed in response to the arguments of the appellant in its statement setting out its grounds of appeal and therefore is not late-filed. D6 teaches selectively using the waste gas of an OBOGS as an auxiliary gas or discharging it to atmosphere. The skilled person knows, as is stated in D9, that it is necessary to render inert the space in a fuel tank of an aircraft under all conditions, which implies varying requirements of the inert gas supply. D6 is a clear teaching to the skilled person to improve the efficiency of an OBOGS/OBIGGS system by utilising the waste gas, thereby rendering obvious the subject-matter of claim 1 according to the main request. This teaching is independent of the arrangement of the OBOGS/OBIGGS themselves.

The additional features of claim 1 according to the auxiliary request fail to establish an inventive step. D6 suggests that the waste gas from the OBOGS be discharged to atmosphere, fed to a plurality of tanks or used for other purposes. The skilled person necessarily would have employed valves in order to put that teaching into effect and the arrangement as presently claimed is then trivial.

Reasons for the Decision

1. It is conventional that aircraft require a supply of gases being enriched in both oxygen and nitrogen. Oxygen is needed for supply to gas masks in the event of de-compression at altitude and nitrogen is important for rendering the space in fuel tanks inert and for countering fire in cargo holds. It is known to obtain the enriched gases by separation of air fed from outside the aircraft through devices known as OBOGS (on-board oxygen generator system) and OBIGGS (on-board inert gas generator system). When fed with air an OBOGS provides an oxygen-enriched product gas and a residual gas which is enriched with nitrogen whilst an OBIGGS provides a nitrogen-enriched product gas. Conventional technology for gas separation includes pressure swing adsorption, otherwise known as molecular sieve, and permeable membrane technology including ceramic membrane generators. It is explained in the patent specification that attempts have been made to improve efficiency of gas separation technologies aboard aircraft but with limited success. The patent relates to an arrangement in which efficiency is improved by using the residual gas of the OBOGS to supplement the product gas of the OBIGGS.

State of the art

2. The patent specification explains that attempts previously have been made to improve the efficiency of gas separation technologies aboard aircraft and acknowledges in particular an arrangement in a V-22 aircraft. During the opposition proceedings the opposition division agreed with the view of the then

opponent (respondent) that in the patent specification paragraph [0006] there was a disclosure of OBOGS and OBIGGS both being fed with air. That view was challenged for the first time by the appellant in its statement setting out the grounds of appeal. D7 was filed at the earliest opportunity in reaction to that challenge and therefore is not late-filed within the meaning of Article 114(2) EPC 1973 and is not evidence which the board would have the power to hold inadmissible, cf. Article 12(4) RPBA. D7 looks at various gas separation technologies and acknowledges an arrangement in a V-22 aircraft. In figure 2 it has a schematic diagram of the V-22 arrangement and clearly illustrates that the air supply through the filter may be directed by a rotary valve to either the oxygen bed or the nitrogen bed. The appellant argues that this alternate operation is not a true parallel arrangement. However, claims 1 according to both requests specify merely that the OBOGS and OBIGGS both receive an air supply and so by implication are not in a series arrangement. This requirement is clearly met by the V-22 arrangement.

3. D2 relates to an air separation unit having a single supply of air to a series arrangement of generators. In acknowledging earlier state of the art it explains that the conditions for separating oxygen and nitrogen are incompatible and had previously necessitated two separate modules, each supplied with ambient air, see column 1, lines 37 to 51. It follows that D2 also discloses earlier state of the art in which OBOGS and OBIGGS each have an air supply.

4. D9 was filed by the respondent in reply to a question raised for the first time in the file by the board in an annex to the summons to oral proceedings. It follows that also this document is not late-filed within the meaning of Article 114(2) EPC 1973.

Inventive step

Main request

5. The closest state of the art is an arrangement having an OBOGS and an OBIGGS each receiving a supply of air as discussed above, best disclosed in D7. The subject-matter of claim 1 differs therefrom in that a residual gas output of the OBOGS is used to selectively supply an auxiliary feed of inert gas. This has the effect that the residual gas from the OBOGS may be used during the initial creation of an inert atmosphere in the fuel tanks and the OBIGGS accordingly may be reduced in size. The corresponding problem to be solved would be to improve the efficiency of the arrangement.
6. D6 relates to an arrangement on an aircraft for producing gas streams enriched in oxygen and nitrogen from an input supply of air. It explains that ceramic membrane generators operate more efficiently when supplied with gas which is already enriched. It accordingly proposes a series-arranged generator in which a first module produces oxygen-enriched gas which is then supplied to a ceramic membrane generator whereby the residual supply from both modules predominantly comprises nitrogen. D6 proposes that residual gas be fed to create an inert atmosphere in a fuel tank (column 3, lines 4 to 6 and 18 to 20) and in

the embodiment of figure 4 it supplements the product gas from an OBIGGS, see column 6, lines 53 to 57. The skilled person faced with the problem of improving the efficiency of the V-22 arrangement would become aware of the teaching of D6 and would recognize it as a solution to his problem.

7. The appellant argues that the teaching of D6 is restricted to serially arranged generators and therefore the skilled person would not recognize it as applicable to an arrangement in which two generators each receive an air supply. The board disagrees with that view because there is no teaching in D6 to that effect. D6 does teach that ceramic membrane generator technology is well suited to both serial arrangement and operation under the conditions necessary for its residual inert gas to be used as an auxiliary supply rather than simply exhausted. In column 3 it is stated that pressure swing adsorption technology, on the other hand, is not well suited to such conditions and that when such a generator is employed in the first module that residual gas may simply be exhausted. The skilled person nevertheless receives the teaching from D6 that residual gas may be used as an auxiliary supply instead of being simply wasted. Although the V-22 arrangement employing pressure swing adsorption technology for the OBOGS is not well suited to the conditions for using the residual gas as an auxiliary supply, the skilled person aware of the teaching of D6 would be motivated to investigate whether the benefits nevertheless would outweigh the disadvantages. Indeed, the board notes that in the sole embodiment in the patent specification the OBOGS units do, in fact, employ pressure swing adsorption technology although the patent specification

contains no teaching regarding any measures which would overcome the apparent disadvantages.

8. On the basis of the foregoing the board finds that the subject-matter of claim 1 according to the main request is rendered obvious by the state of the art and therefore does not involve an inventive step (Article 100(a) EPC 1973).

Auxiliary request

9. The subject-matter of claim 1 essentially differs from that of the main request by the addition of the following features:

- at least one OBOGS and at least one OBIGGS share a common air input; and
- a first control valve selectively supplies a waste gas output of the at least one OBOGS to either the atmosphere or to a second control valve;
- the second control valve selectively supplies the waste gas output of the at least one OBOGS as an auxiliary supply of inert gas to either of two locations.

- 9.1 The additional feature of a common air input is already known from the V-22 arrangement both as acknowledged in the patent specification column 2, lines 12, 13 ("common system components such as the air filter") and as disclosed in D7 which also illustrates a single air feed line to both OBOGS and OBIGGS, incorporating a filter. The appellants argue that in accordance with D7

no common air input is present because there is a rotary valve in the air feed line whereby the OBOGS and OBIGGS cannot operate simultaneously. The board can see no validity in that argument, however, since claim 1 neither explicitly nor implicitly requires that both the OBOGS and OBIGGS be operable simultaneously.

9.2 D7 furthermore already suggests feeding inert gas to two locations, namely the fuel tanks and cargo spaces, see page 52, 5th paragraph. Indeed, the patent specification acknowledges that this was already known, see column 1, lines 21 to 25. Similarly, D6 suggests that residual gas may be exhausted, fed to the fuel tanks or otherwise put to use, see column 6, lines 58 to 60 and column 7, lines 44 to 50.

9.3 The remaining additional features of present claim 1 which are not known from the combination of D7 and D6, namely valves directing the inert gas either to waste or to either of the two locations therefore solve the problem of putting the combined teaching of D7 and D6 into practical effect. The skilled person would be aware that the demand on inert gas to be supplied to the fuel tanks varies in dependence on the flight condition, see D9 page 2, lines 6 to 16. It would be a trivial measure for him armed with that information and wishing to put into effect the teaching resulting from the combination of D7 and D6 to use selectively operated valves since they fall within his general technical knowledge. Indeed, D7 explicitly discloses a selector valve for directing a supply of oxygen-enriched gas, see figure 2.

10. For the foregoing reasons, despite the features added to claim 1 in accordance with the auxiliary request the subject-matter is still rendered obvious by the state of the art. It follows that also claim 1 according to this request does not involve an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Vottner

S. Crane