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Bezeichnung der Erfindung: Auxiliary Power Unit Scoop and Inlet
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : B 64 D 33/02

ENTSCHEIDUNG / DECISION

vom / of / du 14 September 1989

Anmelder / Applicant / Demandeur : The Boeing Company

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56 EPC

Schlagwort / Keyword / Mot clé : "Inventive Step (yes)"

Leitsatz / Headnote / Sommaire

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Case Number : T 104/87 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 14 September 1989

Appellant : The Boeing Company
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Decision under appeal : Decision of Examining Division 70 of the European Patent Office dated 15 October 1986 refusing European patent application No. 82 900 434.0 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : P.E.M. Delbecque
Members : C.T. Wilson
O.P. Bossung

Summary of Facts and Submissions

I. European patent application No. 82 900 434.0 filed on 14 December 1981 as an international application No. PCT/US 81/01667 and published under the international publication No. WO 82/02181 was refused by a Decision dated 15 October 1986, based on Claims 1 to 11 filed on 11 June 1986.

The reason given for the refusal was that the subject-matter of the claims did not involve an inventive step in the light of the combination of the disclosure of US-A-4 174 083 (D1) with the disclosure of any one of US-A-3 001 740 (D2), US-A-3 659 424 (D3) or US-A-3 347 496 (D4).

II. On 15 December 1986 the Appellant (Applicant) filed an appeal against this decision, together with the payment of the appropriate fee, and submitted a Statement of Grounds on 9 February 1987.

The Appellant argued that it would not be obvious to combine D1 with any of D2, D3 or D4. Whereas D1, as also the present invention, was directed to an air inlet and scoop specifically for use in the tail section of a large aircraft for an in-flight auxiliary power unit, D2, D3 and D4 are for use with main engines, lift engines, and ramjet engines or after-burning units respectively, where the boundary layer conditions are completely different.

He therefore requested that the contested Decision be set aside and that a European patent be granted on the basis of the refused claims. Subsidiarily, he requested grant of a European patent on the basis of Claims 1 to 4 filed with the Statement of Grounds.

In response to a communication from the Board, in which doubts were expressed in respect of the patentability of the subject-matter of Claim 1 of the main request, the Appellant withdrew the main request and requested grant of a European patent on the basis of the Claims 1-4, filed with the Statement of Grounds, filing an appropriately amended description and drawings.

Claim 1 of this request reads as follows:-

"Air inlet and scoop specifically for use in the tail section of a large aircraft, for an in-flight auxiliary power unit, the scoop being adapted to open the air inlet and allow the power unit to start operation at altitude under conditions, in which thick air flow boundary layers exist in the area of the inlet, and on the ground, and to close the air inlet, comprising:

an inlet opening contoured along its outer edges to conform to the aircraft fuselage wall,

a ramp trailing inwardly from the opening starting from the fuselage wall and forming the bottom surface of the inlet,

the inlet having side walls trailing inwardly along opposite edges of the ramp and extending from the fuselage edges along the inlet opening,

a scoop hingedly engaged to said aircraft adjacent said fuselage and adjacent one end of said inlet opening,

said scoop having a closing wall with respect to said inlet opening, said closing wall closing said opening in the closed position and being contoured to conform with the fuselage surface in the closed position,

means in said aircraft to operate said scoop from positions in which said closing wall opens and closes said inlet opening, and

said scoop having a guiding wall part, at least in the open position extending outside the inlet opening at an angle to the fuselage wall for guiding air into the inlet,

c h a r a c t e r i z e d i n t h a t

the inlet side walls are parallel to each other,

the scoop further comprises parallel side walls extending from said guiding wall part at a distance as to be capable of being juxtaposed to respective inlet side walls, and in that said scoop is further arranged such that in the open position the trailing edge of the guiding wall part extends closely adjacent the trailing edge of the inlet opening and together with the scoop side walls extending therefrom, forms a channel continuous with the inlet, and in that said scoop has a generally rectangular cross section; a bottom surface thereof forming said closing wall, and an upper surface thereof forming said guiding wall."

Reasons for the Decision

1. The appeal is admissible.

2. A comparison of the wording of the original independent Claims 1 and 12 with Claim 1 of the present request shows that the new claim has been amended **inter alia** by the addition of some features and by the deletion of a specific reference to a feature, viz:

"said closing wall being continuous in the open and closed positions and generally limited to the extent of said inlet opening".

However, the omitted feature is partly not clear and partly selfevident. It is not clear with what the closing wall is intended to be continuous, the reference to the open and closed positions suggesting that it is not the uninterrupted surface of the closing wall itself which is being referred to since this would be unaffected by the position of the wall. Further, any part of a scoop which closes an inlet constitutes "a closing wall", and such part would clearly be "generally limited to the extent of the inlet opening" which it closes.

Also, the features added to Claim 1 are clearly disclosed in the original application.

No objection under Article 123(2) therefore arises.

3. **Novelty**

3.1 The two-part form of Claim 1 is correctly based on the disclosure according to US-A-4 174 083 (D1) and the subject-matter of the claim therefore differs from this disclosure by the characterising features of the claim.

3.2 In US-A-3 001 740 (D2) (Figures 3 and 4), is disclosed an air inlet and scoop for an aircraft, (the scoop (14) being adapted to open and close the air inlet), comprising an inlet opening contoured along its outer edges to conform to the aircraft fuselage wall, and having parallel side walls trailing inwardly along opposite edges thereof and extending from the fuselage edges along the inlet opening. The scoop (14) hingedly engages said aircraft adjacent said fuselage and adjacent one end of said inlet opening, and has a closing wall with respect to said inlet opening, said closing wall closing said opening in the closed position and being contoured to conform with the fuselage surface in the closed position. Means are provided in said aircraft to operate said scoop from positions in which said closing wall opens and closes said inlet opening. The scoop has a guiding wall part, at least in the open position extending outside the inlet opening at an angle to the fuselage wall for guiding air into the inlet, and parallel side walls extending from said guiding wall part at a distance as to be capable of being juxtaposed to respective inlet side walls. The scoop is moreover arranged such that in the open position the trailing edge of the guiding wall part extends closely adjacent the trailing edge of the inlet opening and together with the scoop side walls extending therefrom, forms a channel continuous with the inlet.

The subject-matter of Claim 1 differs therefrom essentially in that according to the claim, the scoop is defined as having a generally rectangular cross-section including a bottom surface forming said closing wall and an upper surface forming said guiding wall, and the air inlet and scoop are specifically for use in the tail section of a large aircraft for an in-flight auxiliary power unit. This is reflected in the technical features of the claim in that the bottom of the inlet is defined by a ramp trailing inwardly from the opening starting from the fuselage wall.

The air inlet and scoop of (D2) are specifically for an aircraft with vertical lift engines, so that no ramp is present.

3.3 Since the other air inlet and scoops revealed in the procedure so far are further removed from the subject-matter of Claim 1 than those of the above citations, the subject-matter of Claim 1 is novel.

4. **Inventive step**

4.1 As pointed out in paragraph 3.1 above, the precharacterising part of Claim 1 is based on the air inlet and scoop of D1 which, instead of a rectangular scoop having upper and lower walls interconnected by parallel side walls, is constructed as a lower closing wall connected to an upper guiding wall or deflector by a single central pedestal (24). The upper guiding wall is preferably formed as an ogee planform but may be of rectangular shape (column 6, lines 30 to 36). The different physical construction from that, according to Claim 1, results also in a completely different way of functioning. Whereas the scoop according to Claim 1 is designed to provide a channel for directing the air therethrough into the inlet, the deflector according to D1 is designed to generate counter-rotating flow vortices that trail the deflector to produce a strong downwash behind (i.e. downstream of) the deflector.

4.2 According to the Appellant (see original description of patent application, page 1, lines 23-25) such deflectors cause an excessive amount of drag, and this is the problem to be overcome by the present invention.

4.3 This problem is solved according to the patent application by the characterising features of the claim.

4.4 It is therefore necessary to consider whether the revealed prior art gives any indication as to whether this problem can be solved in this way.

Such consideration results in the following observations.

4.5 As pointed out in 3.2 above, the air inlet and scoop of D2 are specifically for an aircraft with vertical lift engines, the scoop being provided with parallel side walls but no inner wall. In this case, the closing wall constitutes also the guiding wall part.

4.6 A foldable ram air scoop is disclosed in US-A-3 659 424 (D3). The scoop body is again provided with two side members, but no inner wall, and is slidable from a stowed position into an operative position.

4.7 In D4 is disclosed an engine inlet system for supersonic V/STOL aircraft comprising a louvred door capable of pivotting to open an upper portion of a wing or fuselage. Again, no suggestion of the provision of a rectangular-sectioned inlet scoop is made.

4.8 In a further document, US-A-4 121 606 (D5), an air inlet duct is disclosed for a jet propulsion missile or other vehicle, and which includes an inflatable tubular duct body movable by means of a pivoted plate from a stowed, deflated, pre-launch position to a deployed, inflated flight position. The duct does not, however, have a rectangular cross-section and again the outer wall constitutes both the closing wall and the guiding wall part.

4.9 In summary therefore, none of the revealed prior art documents, taken alone or in combination with each other, suggest to the man skilled in the art that he could solve the problem of excessive drag on the deflector of D1 by means of the rectangular cross-section scoop of Claim 1.

4.10 Starting from the prior art disclosed in D2, the problem to be solved is objectively determined as being to render the air inlet and scoop of D2 suitable specifically for use in the tail section of a large aircraft for an in-flight auxiliary power unit. The solution is not only in the provision of a ramp, but also of the rectangular cross-section scoop as set out in Claim 1.

As pointed out above, such a scoop is neither disclosed in, nor suggested by the revealed prior art, so that the man skilled in the art receives no clue to solve his problem in this way.

4.11 The subject-matter of Claim 1 therefore involves an inventive step, and the claim is allowable.

5. Claims 2 to 4 define further embodiments and meet likewise the requirements of the EPC, and are also therefore allowable.

Order

For these reasons, it is decided that:

1. The Decision of the Examining Division dated 15 October 1986 is set aside.

2. The application is remitted to the first instance with the order to grant a European patent on the basis of the following documents:

Claims 1 to 4 received 9 February 1987
Description, pages 1 to 4 received 11 July 1989, amended to correct the obvious clerical error in the last word on line 1, page 1, and to express the units also in the metric system on pages 1 to 3
Drawing sheets 1/2 and 2/2 received 11 July 1989.

The Registrar: The Chairman:

S. Fabiani

S. Fabiani P.E.M. Delbecque